# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCI. No. 2208.] LONDON, SEPTEMBER 5, 1905. [57TH YEAR. PRICE 6d.



**PARKER & LESTER,**

— *ESTABLISHED 1830.* —

MANUFACTURERS AND CONTRACTORS. **ORMSIDE STREET, LONDON, S.E.**

THE ONLY MAKERS OF

**PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.**

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

**SAFETY GAS-MAIN STOPPER,**

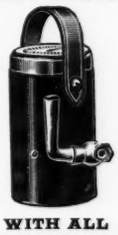
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

SHORT'S PATENT

**GAS-LEAK INDICATORS.**

FOR GROUND USE FLUSH BOXES ETC.

HIGHLY SENSITIVE. LONG RANGE.

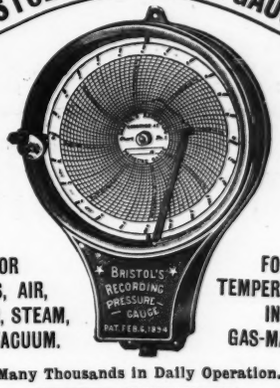


FOR PURIFIER BLOW-OFF VALVES.

FOR HARD USAGE.

WITH ALL LATEST IMPROVEMENTS.

**BRISTOL'S RECORDING GAUGES**




FOR GAS, AIR, WATER, STEAM, OR VACUUM.

FOR TEMPERATURE IN GAS-MAINS.

Many Thousands in Daily Operation.

**J. W. & C. J. PHILLIPS,**
23, COLLEGE HILL,
**LONDON, E.C.**

**GAS COOKER REPLACEMENTS**

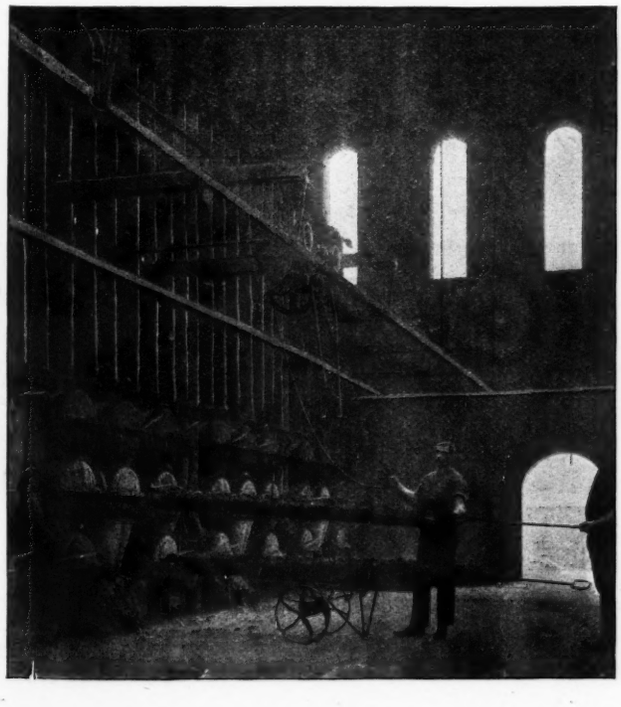
ANY PATTERN MADE INTERCHANGEABLE WITH THE PART NOW IN USE.

Telegrams: "AMOUR, LONDON."
Telephone Nos.: 1890 HOLBORN; CENTRAL 194.

**A. G. CLOAKE,**
54, HOLBORN VIADUCT, LONDON, E.C.

**BIGGS, WALL, & CO.,**
13, CROSS STREET, FINSBURY, LONDON, E.C.

Telegrams: "RAGOUT, LONDON."
Telephone: 273 CENTRAL.



**"RAPID"**
**MANUAL & POWER**
**CHARGING APPARATUS,**

FOR GAS-WORKS OF ALL SIZES.

Repeat Orders

YEOVIL, NEWPORT, SOUTHBANK, WORTHING, ALDERSHOT.

Machines can be seen working at any of the following Works:—

ALDERSHOT
WORTHING
YEOVIL
TRURO
NORMANTON
WESTON-SUPER-MARE
GOOLE
HARLOW
WREXHAM
SWINDON
EPSOM
SHETTLESTON
DUBLIN
G. S. & W. Rly. Works
NEWPORT, MON.
CLEVEDON

# JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "Evans, Wolverhampton." London Address: Salisbury House, London Wall, London, E.C. National Telephone: No. 7089.

12,000 PUMPS TRADE MARK. Please apply for Catalogue No. 8. STOCK AND PROGRESS.

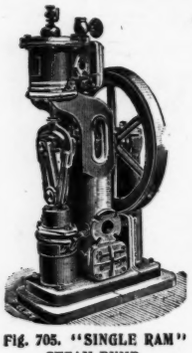


Fig. 705. "SINGLE RAM" STEAM-PUMP.

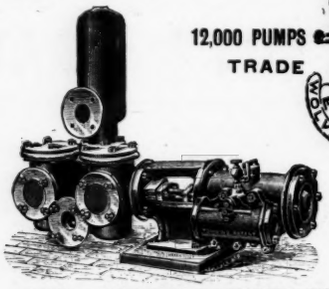


Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

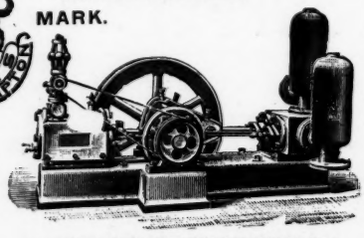
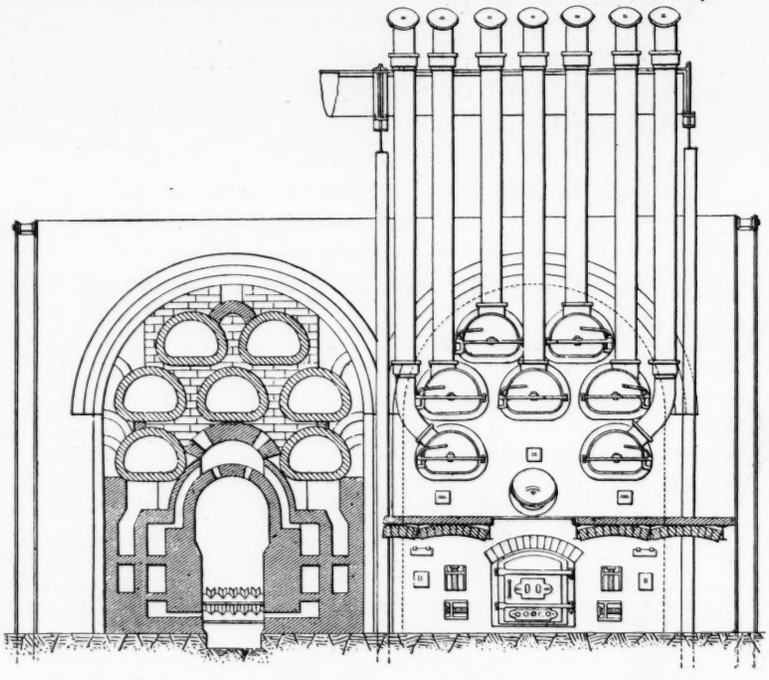


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

Telegrams— "Cockeys Frome." **EDWARD COCKEY & SONS, Ld.** Telephone No. 16.

BALE AND HARDY'S SPECIAL GENERATOR AND REGENERATOR SETTINGS.



GIVING THE BEST KNOWN RESULTS WITH REGARD TO HEATS & ECONOMY IN FUEL.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.

THE IRON WORKS, FROME, SOMERSET.

Every Description of

FIRE-CLAY GOODS

OF BEST QUALITY ONLY.

Personal attention given to all orders.

# MOBBERLEY & PERRY, STOURBRIDGE.

INCLINED AND HORIZONTAL RETORTS of both Taper and Parallel Sections.

SPECIALS FOR WATER GAS PLANTS.

CHECKER BRICKS ALWAYS IN STOCK.

LARGE STOCKS KEPT.

# THE BARROWFIELD IRON-WORKS, LIMITED,

GAS ENGINEERS & CONTRACTORS,

Telegrams: "GASOMETER GLASGOW."

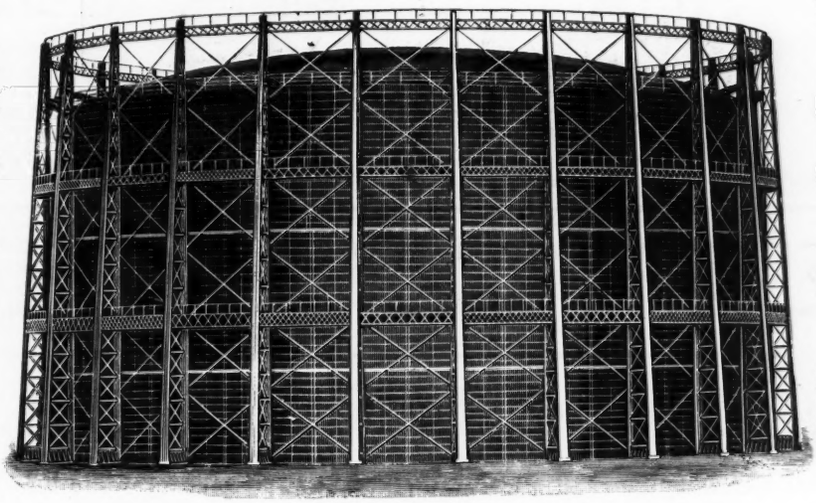
GLASGOW.

OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.



GAS APPARATUS OF EVERY DESCRIPTION

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM BOILERS, AND FITTINGS.

THREE-LIFT GASHOLDER. Capacity, SIX MILLION cubic feet.
240 feet Diameter by 45 feet Deep each Lift. Erected at Glasgow.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

# GEORGE ORME & CO. (Branch of Meters Ltd.)

ATLAS METER WORKS,

*Tel. Address: "ORME OLDHAM."*
*Telephone No. 93 Oldham.*

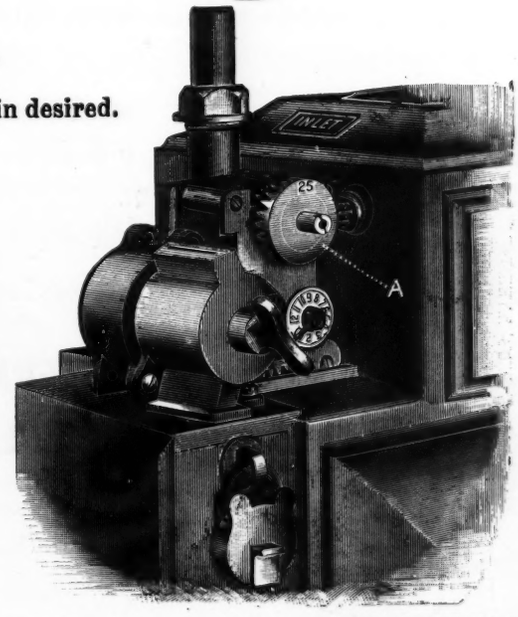
PARK STREET, OLDHAM.

## "NEW CENTURY" PATTERN

*Patent Coin* *Prepayment Gas-Meters*

**Fitted with Detachable Attachments.**

**Arranged for 1d., 1s., or any other Coin desired.**




Change of Price effected by simply removing Crown Wheel "A" and replacing same with another Wheel.

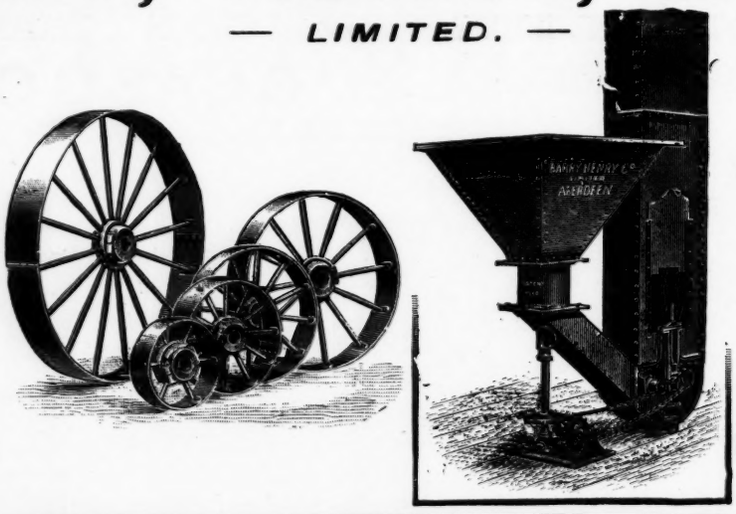
ANY FURTHER PARTICULARS WILL BE SUPPLIED UPON APPLICATION.

# BARRY, HENRY, & CO.,

— LIMITED. —

*Specialities:*
**TRANSMISSION OF POWER.**
Rope & Belt Pulleys,
Spur & Bevel Wheels,
Shafting & Couplings,
Pedestals, & Fixings.

*WORKS:*
ABERDEEN,
SCOTLAND.



*Specialities:*
**TRANSMISSION OF MATERIALS.**
Conveyors,
Elevators,
Grinding Machinery,
Motors.

*AND*
64, MARK LANE,
LONDON, E.C.

# NEWTON, CHAMBERS, & CO.,

LIMITED.

**THORNCLIFFE IRON-WORKS, near SHEFFIELD.**

**Established 1790**

LONDON OFFICE: **19, Great George Street, WESTMINSTER.**

Telegraphic Addresses, "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

## GAS ENGINEERS, IRONFOUNDERS, and CONTRACTORS.

*MANUFACTURERS OF EVERY DESCRIPTION OF*

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

**PURIFIERS with Planed Joints a Speciality.**

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

*DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.*

**PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its Unrivalled excellence.**

GAS
THE WINSTANLEY SPECIALTY COY.
ENGINEERS

## GAS ENGINEERS.

CONTRACTORS FOR, AND ERECTORS OF, ALL GAS-WORKS PLANT.

**REGENERATORS, GENERATORS, AND DIRECT-FIRED RETORTS.**

RESULTS GUARANTEED.

COMPLETE INSTALLATIONS OF HORIZONTAL AND INCLINED RETORTS.

*ADDRESS—*
NEWTON CHAMBERS, CANNON ST., **BIRMINGHAM.**

# WELSBACH LIGHT

(PATENTED)

Fig. 35. 100 c.p.

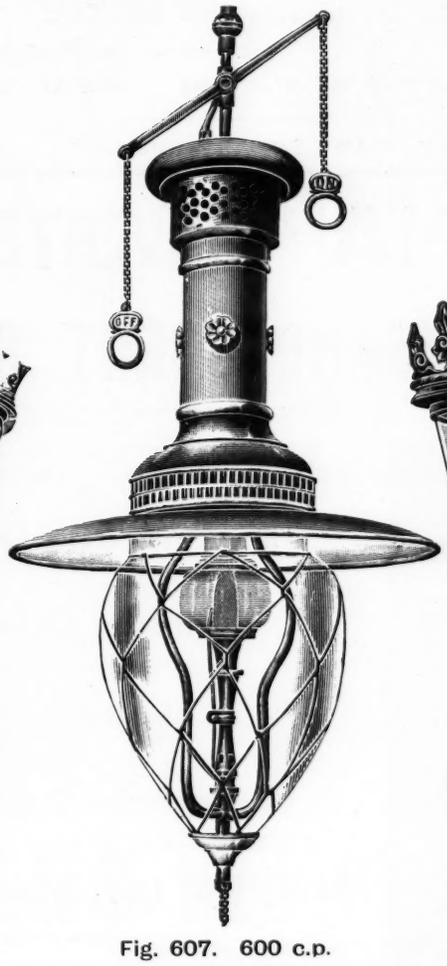



Fig. 607. 600 c.p.
Self-Intensifying.

Fig. 35a. 300 c.p.
Self-Intensifying.

## WELSBACH "C," "CX," AND PLAISSETTY MANTLES,

**4½d. each, subject.**

**Thousands of the above Lamps in use and giving satisfaction.**

**EACH LAMP AND MANTLE GUARANTEED.**

**THE**

# WELSBACH INCANDESCENT GASLIGHT CO.

LIMITED

**2 to 14, Palmer Street, WESTMINSTER, S.W.**

*Telegrams: "WELSBACH, LONDON."* *Telephone: 290 WEST.*

# JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE, & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

# ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

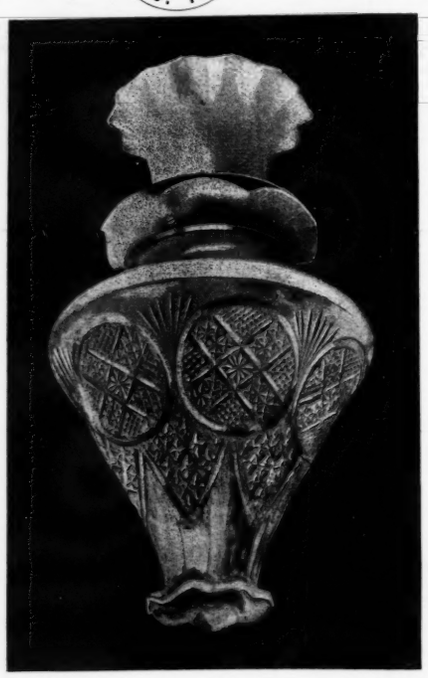
Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

# THE "ETNA" INVERTED INCANDESCENT GAS BURNER.

PATENTED — 1904. — NO. 15,883.



Small Gas Consumption.

Does not light back.

Brilliant Light.

No Blackened Surfaces.

Regenerative Principle.

ILLUSTRATED LIST ON APPLICATION.

THE "ETNA" LIGHT CO.,

296, Broad Street, BIRMINGHAM.

PURIFYING MACHINES, SCRUBBERS,

# TAR EXTRACTING WASHERS.

Water or Atmospheric Condensers. SULPHATE & SULPHUR PLANTS.

LUTELESS PURIFIERS WITH

SPECIAL RUBBER JOINTS and MILBOURNE'S Patent AUTOMATIC RAPID FASTENERS.

# C. & W. WALKER, LTD.,

110, CANNON STREET, LONDON, E.C.

Midland Iron Works, DONNINGTON, near Newport, Shropshire.

Telegraphic Addresses { FORTRESS DONNINGTON, SALOP. FORTRESS LONDON.

Registered Offices
Adjoining Lye Station, G.W. Railway.

Telegrams:
"Harrison, Lye."

# GEORGE K. HARRISON, LIMITED,

Proprietors of

## STOURBRIDGE FIRE-CLAY MINES, BRICK WORKS, & COLLIERIES,

## STOURBRIDGE.

Works, Collieries, and Mines:
**BRETTELL LANE, NAGERSFIELD, and LYE.**

---

**TIMMIS'S PATENT**

# CLINKERING DOOR.

For Illustrated Advertisement, with full Particulars, see "JOURNAL" for April 4, p. 66.

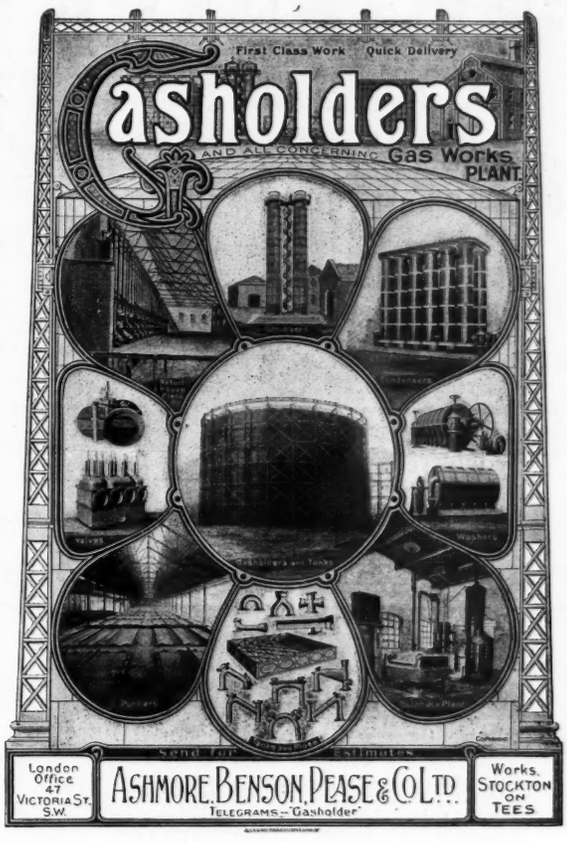
## GEO. H. TIMMIS,

**River Stour Works, STOURBRIDGE.**

Telegrams: "TIMMIS, LYE." National Telephone: 13, LYE.

or of **HARPER & MOORES, LTD.,**
**STOURBRIDGE.**

---


First Class Work Quick Delivery
Gasholders
AND ALL CONCERNING Gas Works PLANT.
Send for Estimates
London Office 47 Victoria St. S.W.
ASHMORE, BENSON, PEASE & CO. LTD.
TELEGRAMS—"Gasholder"
Works. STOCKTON ON TEES

---

# THE "BRAY" INCANDESCENT GAS
# BURNERS AND MANTLES.

"Bray" Burner "C" with Patent Gas Adjuster.

**An Ideal Combination of Incandescent Gas Lighting.**

HAVE YOU SEEN

## THE "BRAY" PATENT GAS ADJUSTER?

This device enables the user to adjust the gas supply to the Burner without decreasing the gas pressure at the nipple where the gas enters the mixing chamber. By so adjusting the gas at the nipple, the highest efficiency can be obtained with any quality and pressure of gas.

**Our Catalogue of Incandescent Gas Lighting Specialities should be held by every Ironmonger or Plumber who desires a Successful Season.**

# GEO. BRAY & CO., LTD., GAS LIGHTING ENGINEERS, LEEDS.

# "STANDARD" PURIFYING GRIDS.

(F. D. MARSHALL'S PATENT.)

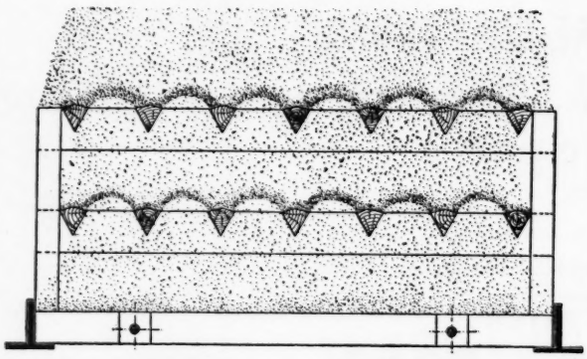
**Manufactured under Licence from Messrs. S. Cutler & Sons, Millwall, London.**

UPWARDS OF 350 PURIFIERS FITTED.

Large increase in volume of Material.

Large decrease in Back Pressure.

Purifier Extensions deferred.



Lightening of Material due to natural arches formed (as illustrated) preventing consolidation.

Sole Licensees and Manufacturers for GREAT BRITAIN and IRELAND and COLONIES—

**KIRKHAM, HULETT, AND CHANDLER, LIMITED.,**

**Palace Chambers, Bridge Street, Westminster, S.W.**

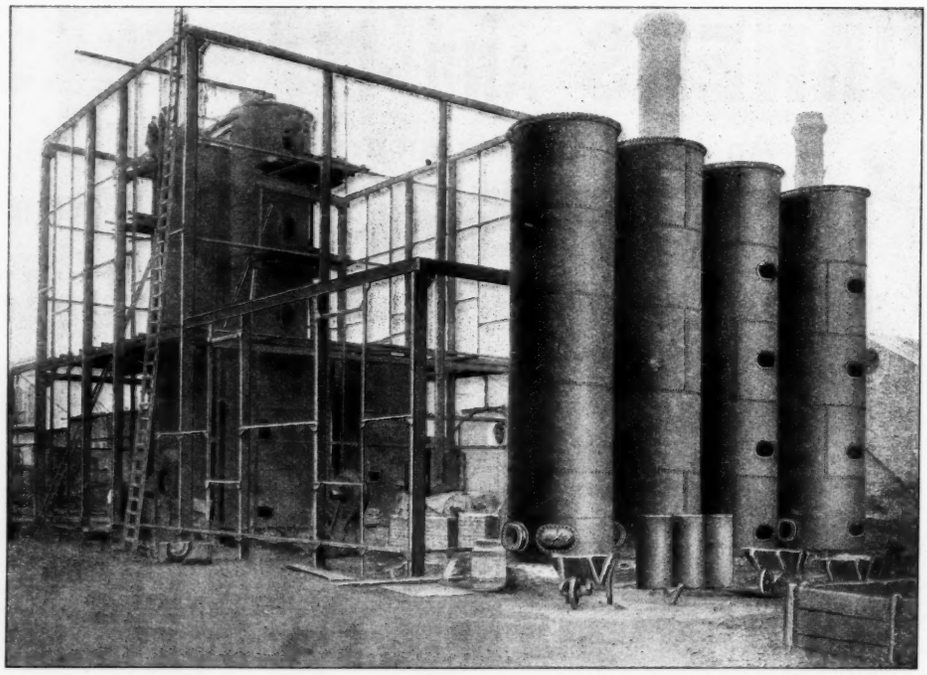
# THE WIGAN COAL & IRON CO., LIMTD.,

**Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.**

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "Parker, London."

# DRAKES LTD.



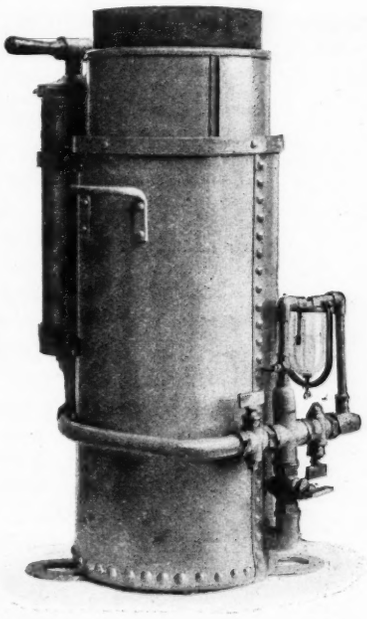
# HALIFAX & LEEDS.

Test your

**MAINS** with

**MILNE'S**

# Leak-Testing Machine.



MADE TO THROW

½ lb. or 15 lbs. per square inch.

MADE BY

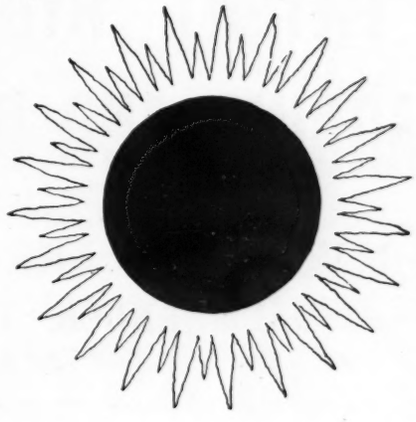
JAMES MILNE & SON

LIMITED,

Milton House Works, EDINBURGH . . .

Also at LONDON, GLASGOW, and LEEDS.

**DIDN'T YOU SEE**



**THE ECLIPSE?**

**NEVER MIND,**

A better one occurs to-day, and is visible in any weather to anybody who takes the trouble to look.

It is

**A TOTAL ECLIPSE**

of all other Gas Cookers by the fame of Wright's "Eureka" Gas Cooker.

JOHN WRIGHT & CO.,
ESSEX WORKS,
BIRMINGHAM.

# ARROL-FOULIS

## PATENT HYDRAULIC MACHINERY

FOR

# CHARGING AND DRAWING GAS-RETORTS

**SIR WILLIAM ARROL & CO., Ltd., Sole Makers,**
**DALMARNOCK IRON-WORKS, BRIDGETON,**
**GLASGOW.**

**LONDON ADDRESS: 32, VICTORIA STREET, WESTMINSTER, S.W**

**PLANS AND ESTIMATES FURNISHED ON APPLICATION.**

THE
**ARROL-FOULIS**
MACHINES
Are Employed at the following Works—

GLASGOW GAS-WORKS—
Tradeston.
Dawsholm.
Dalmarnock.

GASLIGHT & COKE COMPANY—
Beckton.
Shoreditch.
Bromley.

SOUTH METROPOLITAN GAS COMPANY—
East Greenwich
Vauxhall.
Rotherhithe.

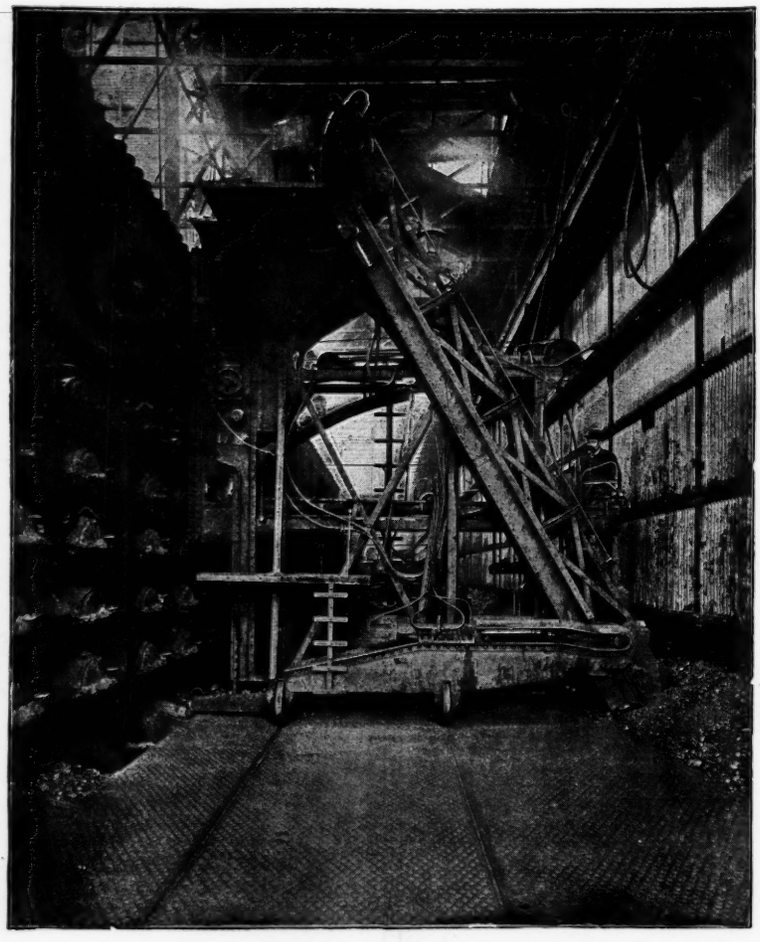
COMMERCIAL GAS-WORKS—
Wapping.
Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

LIVERPOOL GAS-WORKS.

BRIGHTON GAS-WORKS.



ROTHERHITHE GAS-WORKS.

THE
**ARROL-FOULIS**
MACHINES
Are Employed at the following Works—

LEEDS GAS-WORKS.

BIRMINGHAM GAS-WORKS.

BRITISH GAS CO.—
Hull.

BOLTON GAS-WORKS.

IMPERIAL CONTINENTAL GAS ASSOCIATION—
Amsterdam.
Vienna.
Berlin.

HAGUE CORPORATION GAS-WORKS—
Hague.

METROPOLITAN GAS-WORKS—
Melbourne.

CLEVELAND GAS-WORKS—
Cleveland, Ohio, &c., &c., &c.

NEARLY
**300 MACHINES**
ARE AT
WORK OR IN COURSE OF CONSTRUCTION.

THE TIME TAKEN TO DRAW AND CHARGE EACH RETORT BY THESE MACHINES AVERAGES

# UNDER ONE MINUTE.

# GEORGE WILSON, COVENTRY,

Wet and Dry Gas Meter Manufacturer.

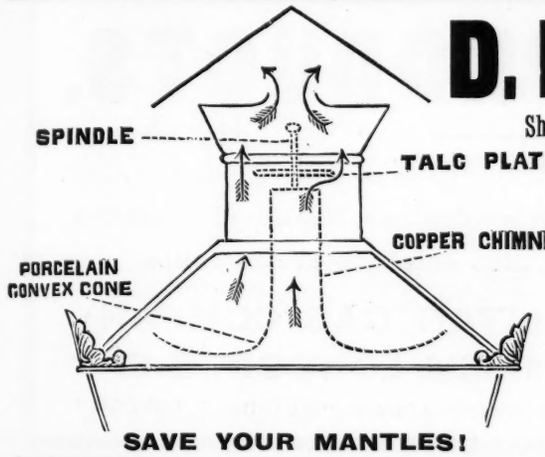
**PREPAYMENT METERS** for Pennies, Shillings, or any other Coin.

GAS METERS.
SLOT METERS.
GEYSERS.
COOKERS.
STOVES.
WORKSHOP LAMPS.
GAS IRONS.
IND. GAS APPLIANCES.
FITTINGS.

**CENTRAL WORKS in DESSAU**
OF THE
**GERMAN CONTINENTAL GAS ASSOCIATION**
(Deutsche Continental Gas Gesellschaft).

For Illustrated Price Lists and full Particulars apply to our SOLE AGENTS FOR THE UNITED KINGDOM AND COLONIES:

**THE INCANDESCENT LIGHTING & MANTLE INSURANCE CO.,**
**57/58, CHANCERY LANE, LONDON, W.C.**
Telephone: 12788 CENTRAL. Telegrams: "FRAENKL, 58, CHANCERY LANE."




SAVE YOUR MANTLES!

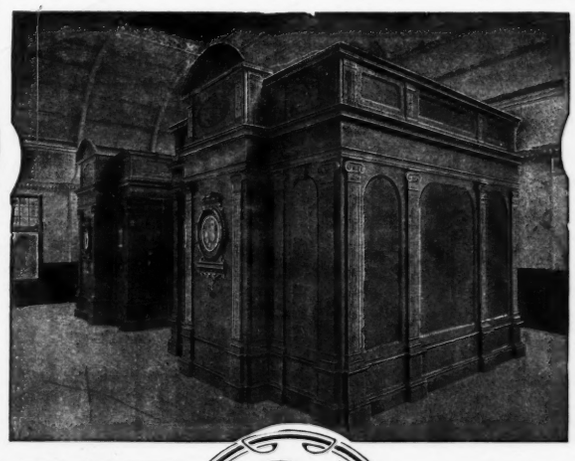
# D. HULETT & CO., LD.

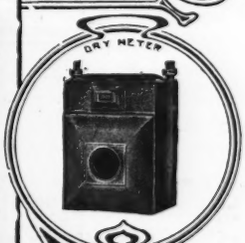
Show-Rooms and Offices: 55 & 56, HIGH HOLBORN, LONDON.
Lamp and Meter Works: Harpur Mews, Theobald's Road, LONDON.

SOLE MANUFACTURERS OF
"BENNETT'S"
**Patent STORM PROOF STREET LAMP.**

MAKERS OF
OUTSIDE LAMPS of every description; also METERS, SERVICE CLEANSERS, and GAS FITTINGS.

# R. LAIDLAW & SON,
LIMITED
GAS & WATER ENGINEERS,






SIMON SQUARE WORKS, EDINBURGH.

6 LITTLE BUSH LANE, LONDON, E.C.

TWO STATION METERS EACH TO PASS 200000 CUB. FT PER HOUR. ERECTED AT THE

GRANTON GAS WORKS FOR THE EDINBURGH & LEITH GAS COMMISSIONERS.

ALLIANCE FOUNDRY & ENGINEERING WORKS.
GLASGOW.

# HISLOP'S PATENT SYSTEM OF BOILER FIRING.

20 °/₀ Saving in Fuel.
20 °/₀ more Water Evaporated per hour.
Steady Steam Pressure.
Fuel Employed—Coal or Coke.

Perfect Combustion—17 to 18 °/₀ $CO_2$ in Waste Gases.
Producer Cleaned once in 24 to 48 hours.
Applicable to all Boilers.

**INEXPENSIVE. DURABLE. SIMPLE.**

DESIGNS AND ESTIMATES FROM

## R. & G. HISLOP, 13. ST. JAMES PLACE, PAISLEY.

**LONDON—87, VICTORIA STREET, S.W.**

# COAL TAR PRODUCTS.

**Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Crude Creosote Salts, Granulated (Crude) Naphthalene, Sublimed Naphthalene, Anthracene, Refined Tar, Pitch, also Sulphate of Ammonia.**

For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY**

Works: ORDNANCE WHARF, EAST GREENWICH, LONDON, S.E.

709, OLD KENT ROAD, LONDON, S.E.

Telegraphic Address: "METROGAS, LONDON."

# THE GAS-METER COMPANY,

MANUFACTURERS OF

WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS

STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (LATE WEST & GREGSON). Established 1830.

*For Prices and Particulars apply*

**F. W. CHURCH, Secretary.**

Works: 238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN; 18, ATKINSON STREET, DEANSGATE, MANCHESTER.

Telegraphic Addresses: "METER LONDON." "METER OLDHAM." "METER DUBLIN." "METER MANCHESTER."

Telephone Nos.: 142 Dalston (Nat.); 340 Oldham (Nat.); 1995 Dublin (Nat.); 2918 Manchester (Nat.)

(See Advertisement on back of Wrapper.

# CONTENTS.


## EDITORIAL NOTES.

GAS, &c.—

Judicious Public Lighting—Proposal to Abandon Electric Lamps at Preston . . 607
Municipal Misconception . . . . . 608
Municipal Lands and Works . . . . . 609
Two Points of View—Interest of Members in Gas Association Meetings—The "Financier" on Gas . . . . . 609

Public Lighting . . . . . 611
Gas Stock and Share Market . . . . . 613
Mr. Brackenbury on British Progress in Gas-Works' Plant and Machinery. . . . . 613
Deterioration of Bookbinding Leathers . . 614
Electric Lighting Memoranda . . . . . 614
Cost and Efficiency in Street Lighting. By G. S. . . . . 616
Electro-Chemical Action and Condensing Gas-Stoves. By F. R. E. Branston . . . 616
The New Winnall Gas-Works for Winchester 617
Coal Sampling and Testing . . . . . 624
New Inventions and Past Records of the Gas Industry . . . . . 625
Sources and Commercial Value of Thorium . 626
The Use of Gas in Modern Motor Shops . . 627
Enrichment of Gas with Benzol — Some American Experiments . . . . . 628
Raising Water by Compressed Air. . . . . 629

## CORRESPONDENCE.

Gasholder Capacity . . . . . 630

## REGISTER OF PATENTS.

Gas-Stoves for Heating Purposes—Bousfield, J. E. . . . . 630
Travelling Platforms for Gas Retort-House Floors—Gibbons, W. P., and Masters, R. . 630
Dust Retainer for Gas-Pipes and Fittings—Smith, T. B. . . . . 631
Discharging Machines for Gas-Retorts—M'Kinlay, R. . . . . 631
Patent Notices . . . . . 631

## MISCELLANEOUS NEWS.

Provincial Gas and Water Companies. . . 632
The Public Lighting of Preston—The Proposed Reversion to Gas . . . . . 633
The Ormskirk Electric Light Scheme—The Local Government Board and the Board of Trade and Electric Lighting Agreements . 634
The First Spiral-Guided Holder in Australia 635
Increased Gas Storage at New Orleans . . 635
Extraordinary Explosion at Peterborough . 635
The Proposed Gas-Works for Withnell . . 635
Liverpool Water Supply—The Present Shortage; Protecting the Sources of Water . . 635
Tynemouth Corporation Water Supply—Visit to the Font Works . . . . . 636
Gloucester Corporation Water Supply . . 636
Notes from Scotland . . . . . 637
Current Sales of Gas Products . . . . . 639
Coal Trade Reports . . . . . 640
Stock and Share List . . . . . 644

## PARAGRAPHS.

A Venerable Lamp Pillar—London Statistics 610
Obituary. . . . . 615
Waverley Association of Gas Managers—Board of Trade "Commercial Intelligence" Advisory Committee — American Gaslight Association . . . . . 625
The Wales and Monmouthshire District Institution of Gas Engineers and Managers. . 627
Producer Gas for Propelling Ships—Tarring the Surfaces of Roads—Wooden Pipes . . 629
Thefts of Water in an Essex Village . . . 631
Gas Manager Checks Serious Conflagration . 640
A New Industry in Gas-Works—Extension of the Hereford Water-Works—Complaint of Vibration Caused by a Gas-Engine—Dissatisfied Slot Consumers at Portsmouth—Manchester Corporation and the Chorlton-cum-Hardy Gas Supply—Shrewsbury Water Supply . . . . . 641
Sale of the Somersham Gas-Works—Successful Artesian Boring—The Pontefract Corporation and the Gas-Works—Bread Baking by Gas—The Explosion at Cape Town—Large Gas-Engine and Producer Plant—Projected Gas Exhibition in Newcastle-on-Tyne—Batley Corporation Gas Accounts—The Recent Electricity Breakdown in Bradford—Suicide by Inhaling Coal Gas. . . 642
Todmorden Gas Managership—Finances of the Southport Water Board—Explosion at the South Shields Gas-Works—Supply of Cookers, Grillers, &c., in Belfast—Electric Light Failures—Graham, Morton, Limited—Bradford Corporation and the Gas Supply of Wilsden . . . . . 643



# Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

# CARBURETTED-WATER-GAS PLANT

**DOUBLE-SUPERHEATER SYSTEM,**

H. & G., LONDON **162,700,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **460,700,000** Cu. Ft. Daily

**TOTAL 623,400,000** Cu. Ft. Daily

**Messrs. HUMPHREYS & GLASGOW,**
**38, Victoria Street, London, S.W.**
**31, Nassau Street, New York.**

**THE UNITED GAS IMPROVEMENT COMPANY,**
**Philadelphia.**

**Telegrams** { "EPISTOLARY, LONDON."
"HUMGLAS, NEW YORK."

# THOMAS GLOVER & CO.'S

## PATENT NEW IMPROVED PREPAYMENT METER

**For Pennies, Shillings, or any Coin.**

**Simple in Mechanism.**
**Positive in Results.**
**Price Changer *in Situ.***

**GUARANTEED FOR FIVE YEARS.**

**Telegraphic Address: "GOTHIC, LONDON."** **Telephone No. 6159 Bank.**

## THOMAS GLOVER & CO., LTD.,

**GAS-METER MANUFACTURERS,**

LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

**Telegraphic Address: "GOTHIC, LONDON."** **Telephone No. 6159 Bank.**

| BRISTOL: | BIRMINGHAM: | MANCHESTER: | GLASGOW: | BELFAST: | MELBOURNE: |
|---|---|---|---|---|---|
| 28, BATH STREET. | 57 & 58, BROAD STREET. | 132 & 134, CORN EXCHANGE BUILDINGS. | 26, WEST NILE STREET. | 8, EXCHANGE PLACE, DONEGALL STREET. | 23, WRIGHT'S LANE, LONSDALE STREET. |
| *Telegraphic Address:* "*GOTHIC.*" | *Telegraphic Address:* "*GOTHIC*" | *Telegraphic Address:* "*GOTHIC.*" | *Telegraphic Address:* "*GASMAIN.*" | *Telegraphic Address:* "*GOTHIC.*" | |
| **Telephone No. 1005.** | **Telephone No. 5009.** | **Telephone No. 3898.** | **Telephone No. 6107 Royal.** | | **Telephone No. 3716.** |

# PARKINSON'S

## PREPAYMENT METERS

**For Pence, Shillings, or any Coin.**

SIMPLICITY . .
DURABILITY . .
EFFECTIVENESS
} COMBINED.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON.

BELL BARN ROAD, BIRMINGHAM.

# JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. XCI., No. 2208.—TUESDAY, SEPTEMBER 5, 1905.


## EDITORIAL NOTES—GAS, &c.

### Judicious Public Lighting—Proposal to Abandon Electric Lamps at Preston.

IN another part of this issue will be found an article, or rather a compilation of public lighting experiences, which we hope will be of some value to those gas engineers and managers who are called upon to take part in the prevalent controversy evoked by the dissatisfaction which ratepayers and many of their representatives alike feel over a system of electric street lighting that cannot find many, if any, points to commend it to favour. This is saying much; but it is said because of our failure—search where we will—to find those points. It was the novelty that gained for electricity for street purposes even the relatively small adoption that it has secured. The novelty is fast wearing off under the chastening influence of heavy cost for the limited area lighted, of capricious performance and even entire failure, and of inability to comply with the round of requirements that constitute efficiency in street illumination.

But the correction of public opinion that these things—these experiences—are bringing about is in many places stemmed by what we believe is only a question of personal dignity. There are in every governing body members who were in majority sufficient to instal electric lighting in the public streets, who, with the recollection of how they ramped but a few years ago after the alluring light, eschew taking the proper and judicious course now simply to save themselves what they foolishly imagine would, by voting to the contrary, be the humility of a tacit confession of quondam weakness. We ask those councillors what lessons their experience has taught them? Has it not been that the initial cost of the installation of electric arc lamps in the streets, with their huge and necessarily tall columns, is enormous? Has it not been that the annual working expense is great? Has it not been that with these high and large centres of light, widely separated on account of the cost, there is not equality of illumination over the road surface; that, with the nooks and projections of architectural inconformity in main streets, deep and inconvenient shadows are cast; and that the entrances to the alleys, courts, and side roads from the electrically lighted main roads are thrown quite into obscurity during the hours of darkness, unless a lamp directly faces the by-way? Widely spaced lamps of great intensity will not, without intermediate assistance, produce a distribution of illumination such as can be characterized as efficient. Sufficient, on this head, is the practical daily experience; but the endorsement of high authorities who have made the matter a special study should also be taken into account.

Among such ranks Professor W. Wedding, of the Charlottenburg Technical College, who says: "The use of very "powerful lights can only be practised to a certain extent with "advantage; for they must be more or less screened, and "then at least 20 per cent. of the light is at once wasted. "The use of very high lamp-standards entails a large outlay "for installation and service; and the illumination of the "ground by few but very powerful lights is very unequal." This statement could not be made to stand out in greater relief by comment. But well may it be asked, What is the good of all the experience in public lighting that has been dearly purchased by the ratepayers, if its lessons are not to be turned to good account on their behalf solely owing to the baneful opposition of those persons who are so jealous of their own dignity, or so thin-skinned, that they prefer not to abrogate one of their public acts lest ridicule follow, though mayhap they would be of the first to do it if it could be done covertly? For their companions they have those councillors who, with the electric lighting undertaking a civic property, have no scruples about throwing economy and efficiency to the winds, so long as the public lighting can be made a rich channel for revenue.

Councillors, however, there are who show their dignity, who evince a faithfulness to the trust reposed in them, by trying to break through the wall of perversity with the view of eradicating from the public lighting branch of the municipal service a condition of things that is anything but compatible with their notions of provident administration. Those who adopt as their apothegm, and their aim, in public work, "The greatest good for the greatest number," fail to see that, in putting into a comparatively small area a limited number of electric arc lamps at a great initial and annual cost, they are serving the means to the end expressed in their guiding principle. Such men exist in almost all the City and Borough Councils of London, and in many other places; and Alderman Pearson revealed himself as of their order at the meeting of the Preston Town Council held last Thursday. There the National Electric Supply Company furnish lighting, by means of 45 arc lamps, in certain of the important thoroughfares. As Chairman of the Streets and Buildings Committee, Alderman Pearson brought forward a recommendation from them that three months' notice be given to the Electricity Company to terminate the agreement for public lighting entered into in 1896. We will not say that Alderman Pearson and his colleagues are following the example of the Corporation of the City of London, but it may be remarked that the experiences of the City that resulted in their adoption of a course similar to that now proposed at Preston coincide with striking completeness. Complaints of the lighting have been made at Preston without remedy—just as in the City. The time came when it was found at Preston that by incandescent gas lighting as efficient street lighting could be obtained at a lower cost—just as it did in the City. Then when the scheme for supplanting an uneconomical and inefficient system by one that is the reverse is proposed, there comes from the Electricity Company a complaint of unfair treatment—just as in the City. The agreement is beautifully perfect.

These arc lamps at Preston are "supposed" to be of 1000-candle power; but the photometrical tests made only credit them with 400-candle power. The amount paid for the light received from the 45 lamps is £825 10s. a year. Again, like the City, Alderman Pearson showed beyond question that there is a saving to be effected, and increased lighting to be obtained, by adopting incandescent gas-lamps on the lines proposed by the Committee, the details of which can be obtained from the report of the Council meeting which appears elsewhere to-day. By the use of 95 incandescent gas-lamps, a better distribution of light than from the arc lamps would result; and about £400 a year less would be required from the ratepayers for lighting the streets in question. The capital cost of conversion, by means of the Podmore and Bellamy types of lamps, is calculated at about £600; so that the annual saving would promptly make a clearance of the charge. In fact, part would disappear immediately, because, as the result of an interview that the Committee had with Mr. Henry Green, the Engineer and Secretary of the Gas Company, the Directors have offered to bear a quarter of the capital expenditure involved; and, of course, they would also be at the expense of providing and laying the service-pipes and supplying the meters—all lamps in Preston being metered. We cannot but applaud the generous action of the Directors in this matter. The determination, however, of the question was staved off at Thursday's Council meeting by a desire of the Tramways' Sub-Committee to ascertain whether there is not some at present unearthed method by which they can persuade the Council to let them supply the street-lamps under the powers they possess. We say "unearthed method," because the question has been before the Tramways Sub-Committee so often and so long that, if there was a plain way by which they could mature their wish at reasonable cost, it would have been found long ago. The London County Council have not discovered, in the lighting of Waterloo Bridge, what the Preston Tramways Committee are now, with new-born eagerness, so anxious to find; nor have the Liverpool Corporation, and many other great municipalities northwards. We calmly look to the Preston

Tramway Sub-Committee coming back from their further quest without greater success than in the past. Meanwhile, we need only say that the matter has been referred to a joint meeting of the Sub-Committees.

It was not only on the question of cost, but on that of efficiency that Alderman Pearson submitted his claim for a favourable reception of the recommendation; and it is upon both that the last point we desire to make hinges. Of course, it could not be expected that the discussion would pass without a reference to that old delusive comparison well-beloved of electricians—the cost per candle power per hour. Electricians know as well as we do that their (to the layman) abstruse calculations and bases of comparison have only one purpose, and that not in the slightest degree creditable. There is all the difference in the world between nominal or reputed candle powers and actual and effective candle powers. If the cost per candle power per hour is not found by electricians by taking the erroneous, but the broad and convenient, base of the nominal or reputed candle power of the arc lamp, then they adopt the alternative of instituting comparisons of the costs per candle power of lights of widely different powers. That is a thing that no upright scientific man should defend. We see the cost per candle power of flame arc lamps compared with ordinary incandescent gas lights; and not like with like. Take an actual 1000-candle power high-pressure gas-lamp and compare with an actual 1000-candle power arc lamp; then we should get something like equality at the base of the calculation, if for practical purposes the necessity of elevating the arc light to such a great height above the gas-lamps did not again come in as a disturbing factor. Moreover, it is not so much illuminating power as illuminating efficiency and effect that should be studied in street lighting; and this is best obtained by the proper disposition of lamps of lower candle power than is given by the current-absorbing and troublesome flame arc lamps. When such a misleading method of comparison as the one that has been so largely resorted to lately by electricians in their extremity is quoted, it will be well to remember these points, together with what is known as to actual and nominal illuminating figures, and what Professor Wedding says in confirmation of daily experience as to the mistake of using high-placed, powerful lights if uniformity of illumination is required. Of greatest importance of all, being the most certain test to apply to the competing lights, is the annual saving which the one offers over the other; and it is that saving which so completely confounds the advocates of public lighting by electricity.

## Municipal Misconception.

"It is an unwise and deplorable impression that seems to "actuate some public bodies, that they are doing their duty "when harassing the industries by which their cities and "towns prosper." This is a sentence, alive with thought and suggestion, that fell from the lips of Mr. Corbet Woodall, in the course of a delightfully interesting speech, at the opening of the new gas-works of the Winchester Water and Gas Company last Tuesday; and, in the furtherance of the general good of the gas industry, we could wish for nothing better than that the speech (a report of which appears elsewhere) could be brought before every member of every municipality in the country. The thought and the truth which the words convey are not new; but they are summed up with such pithiness that they invite pause and consideration. The occasion was one that was calculated to inspire such conception and expression. The Chairman and Directors and shareholders of the Winchester Water and Gas Company were gathered together with the Mayor and Corporation of the city—and even the Chairman of the local Electric Light Company was an honoured and friendly guest—to celebrate the opening of the Company's new gas-works at Winnall. From his Worship, from the Chairman of the Electric Light Company, and from many others, came cordial wishes for the continued and increasing prosperity of the Company from this eventful period in their history; and there was nothing wanting to assure those of the assembled company from a distance that of the governing body of ancient Winchester and of the great trading companies in their midst, the epigram "Friends all" could be used in the fullest sense. While the Corporation do not, in their relations with the Trading Companies of the city, overlook or neglect the duties that devolve upon them in their representative and administrative capacities, they are also animated by the view that their duty extends to the Companies, that the Companies have a great claim upon them, that their relations should be mutually helpful, and that the prosperity of the undertakings contributes to, and does not detract from, the commonweal. A witness of this is the passing without contest, through mutual confidence, of the Act obtained by the Water and Gas Company in 1903, which will promote the interests of city, the consumers, and the shareholders alike.

The harassing of trading enterprises by municipalities of which Mr. Woodall spoke has, in truth, become a reproach; and the mistakes of so-called Progressivism have not tended to minimize the tension in relationships. Misconception has led to misjudgment; and misjudgment to mismanagement of the interests of the ratepayers. It is therefore the misconception that needs uprooting; but it cannot be uprooted until those within whom it is found recognize the error of its existence. Let us pursue the point. Of whom is a town's governing body composed? The answer is, The elected representatives of the ratepayers. It is true the large joint-stock companies have not a vote; but in great part they are made up of shareholders (not forgetting, too, the workmen) who, in their individual capacity, are of the electorate. They pay rates as private householders; and so they have a vote. But the far greater amount of money contributed to the municipal treasury by the company does not, as the law (it is hoped only temporarily) stands, entitle them to a vote. The duty of a municipality is to promote and defend the interests of the whole of the ratepayers; and therefore does it not follow that, as the principal ratepayers in their corporate capacity, as considerable ratepayers in their private capacities, those constituting the greatest trading companies of a city or a town have a just claim on the municipality to do their part to promote and protect the interests of the concern in common with the interests of the other and smaller ratepayers? Now, this is an aspect of the matter to which for the most part local authorities are blind. Indeed, in assisting the companies and in protecting them, the municipal governing body are assisting, promoting, and defending the interests of the whole community. All that the companies ask is that the treatment meted out to them should be considerate and just, and that they should not be treated as being hostile to those within their own field of activity. The misconception that is all too general is found in the belief that, by harassing those directing such industries as gas supply, the local authority are best serving the general ratepayers. It is this misconception that produces misjudgment in regard to the acts and proposals of those administering such concerns; and this misjudgment, as is seen so frequently, results in the mismanagement of responsibilities that wreaks injury on some of the highest interests of the inhabitants.

The whole trend of legislation of late has been to make the interests of statutory gas supply companies and the inhabitants of a town identical. In these days, the greater the prosperity of a company, the more liberal the encouragement the local authority accord the company in striving to attain after further prosperity, the greater the profits that must be, under the regulation imposed by the legislation of the times, handed out to the consumers in reductions of price before the shareholders may take to themselves even a comparatively small proportion of the fruits of the prosperity. The greater the prosperity, again, the larger the necessary manufacturing and distributing works; and therefore the larger the direct contributions to the municipal purse. To this, so long as the measure of the increased contribution is fairly taken, no gas company would raise objection. But they do object to the payment of money beyond what is legitimate, and to the waste of money, seeing that both are against the interests of those they serve, and who are their fellow-ratepayers. Again, a growing feature of these companies (and Parliament countenances the change) is the extended financial interest taken by ratepayers in the undertakings. It is therefore, from all points of view, to the interest (nay we will place it on the higher plane of duty) of local governing bodies to do all in their power to promote the welfare of such trading enterprises —not to put obstacles in the path to the development of business, not to search for pretexts for raising frivolous objections, not to cause waste of money in parliamentary and legal expenses, when a reasonable spirit would smooth away most, if not all, the little excrescences that are bound to appear in the conduct of a large industrial concern doing business in every street and in almost every business establishment and dwelling-house. There should be no antagonism when, as must be seen, interests have a commutuality, and are best

advanced by the respective bodies going hand in hand. If municipalities would only give way one point, and approach many of the matters that bring about friction with the feeling that those who manage these industrial concerns must, from their experience, be the better judges, and then try to appreciate the position from the standpoint of those with that greater experience, we venture to think that much of the misconception, misjudgment, and consequent mismanagement in the public service, would give place to a more healthy condition of things than now exists in many towns. The prosperity of a community is the prosperity of a gas company; the prosperity of the company is the gain of the town. This, we think, is clearly proved by what is written; and in more pronounced form by the illustrations to be found throughout the country.

We commenced with a quotation from Mr. Woodall's last week's speech, and we may well end with another, which is worthy the consideration of our municipal friends. It is this: "It is not in places where dividends are low that gas "or water is supplied at cheap rates, and the interests of "the consumers are well cared for." To business men who understand the terms upon which Parliament grants to such companies their rights and privileges, the regulation to which they are subject, and the vigilance which the proper administration of the undertakings demands, there is no need to expound this declaration.

## Municipal Lands and Works.

An action has been concluded in the Chancery Division of the High Court of Justice, the decision in which may be of much future value to the various departments of municipal service. It relates to the use of land for any purpose other than that for which it was originally acquired. The Gas-Works Clauses Act of 1871 and the Gas and Water Works Facilities Act of 1870 are sufficient to keep all gas undertakers straight as to the lands upon which they may manufacture and store gas and those which they may only hold for less useful, and therefore less remunerative, purposes. There may at times, in the case of local authorities, however, be a temptation to save outlay by utilizing for other purposes a portion of the land acquired for gas-works; but the decision to which allusion is made says that this must not be, without parliamentary authority to the transference of the land to the new purpose. Negligence of the judicial pronouncement may find other local authorities in the same predicament as the Pontypridd District Council are in to-day.

Pontypridd has not been so far fortunate in its electricity undertaking; and the action which has now gone against them has not lightened the difficulties with which they are confronted. But Mr. Justice Farwell—while sympathizing with the Council when he should have reproved those who were responsible for what was practically an open defiance of an Act of Parliament—had no alternative but to give judgment against the Council. Refuse destructors, under the best possible conditions of working, are not what most people would welcome as being desirable neighbours. When the Trustees of the Llanover Estates sold 1½ acres of their land to the Pontypridd District Council for an electricity generating station, the fact that the Council intended to use part of the ground for a refuse destructor was not disclosed to them; and, when they did hear of it, they naturally felt that the value of their property would not be improved by the presence of the destructor. There is not the slightest doubt that the destructor was an afterthought, and was not part of the original scheme. This, indeed, is plainly demonstrated by the fact that, at an inquiry for loans, the Council asked the Local Government Board to sanction the use of a portion of the ground for the purpose; but the Board had no power to be parties to its employment other than for the purposes for which it was acquired and authorized. The Board, however, artlessly suggested that the easiest, though circuitous, way of getting over the trouble was by the sale to, and repurchase from, the Trustees of the piece of land that was necessary for the accommodation of the destructor. The Trustees, as may be imagined, declined to entertain such a proposal; and so the Council adopted what they thought would prove a satisfactory subterfuge. They conveyed to a Mr. Davies the land required from their electricity works site, in consideration of a sum of £250, and then had it reconveyed to them for a like sum. As a matter of fact, no consideration passed; and the little ruse failed. The Council commenced the construction of the destructor; and the action referred to was instituted by the Trustees.

It can be seen that any legal endorsement of the use of land for a purpose at variance with that for which it was originally purchased and authorized might have many far-reaching results. If in this case Mr. Justice Farwell had admitted that land avowedly purchased for a distinct object, under a Special Act, could be transferred to any other object upon the mere change of intention of a local authority, it can readily be seen how very easily Acts of Parliament could be ridiculed, and purchased lands put to unjustifiable use by local authorities. It might even be that some authorities would use lands bought for gas-works purposes for sewage farms; or, under the land purchase powers for a sewage farm, they might buy sufficient land for a hospital. A somewhat similar suggestion to this was made by Lord Justice Rigby in an identical case in which the Hanwell District Council were concerned; and if Mr. Justice Farwell had been favourable to the Pontypridd District Council, the decision would have been contrary to that in the Hanwell case, and likewise to one of Mr. Justice Romer in which the Teddington Urban District Council were defendants. The Pontypridd people could, as the sanitary authority under the Public Health Acts, acquire lands for a destructor; but the power and purpose are quite distinct from their power to acquire land under the Electric Lighting Acts for an electricity generating station. The purpose for which the heat from the destructor was intended to be used, of course, does not make the latter any the less a refuse destructor. Unfortunately, the District Council have already put up the buildings for the destructor; but they are restrained from using them for this purpose, or any other than the supply of electricity. The case is one which has obviously such an extended application to municipal undertakings and lands, that this short discussion of the main point involved cannot fail to be interesting, if not a preventive of similar error and practically useless outlay.

### Two Points of View.

A correspondent writing in a Bristol newspaper a few days ago made it a matter of complaint that the Gas Company of the city get a profit from the carrying on of their business; and he suggested that if any profit was to be made out of the supply of gas, it ought to go into the pockets of the ratepayers. What service, he asked, does the Gas Company render the citizens of Bristol which they could not perform more cheaply and efficiently for themselves, to justify the Company "exacting" a yearly tribute? Now, that is a question which has been asked with regard to many companies. It is the foundation of the whole theory of municipal trading—the theory, namely, that all public services which are in the nature of monopolies should be carried on by the community for the benefit of the community. The justification of municipalization rests upon the argument that the service which is rendered by the individual or the company for gain, can be performed more cheaply and efficiently by the public for themselves. This is not the time to consider whether the argument is sound or otherwise. It is, however, a fact that generally speaking consumers of gas are no better off under a corporation than under a company. With regard to cheapness of supply, we question if the advantage is not, on a strict comparison, with the companies, who are not only bound by statutory limitations as to profit, but are driven by competition to sell gas at as low a price as possible. Whether this be so or not, it is a coincidence worthy of remark that, while one person in Bristol was writing of the imagined greater cheapness and efficiency of municipal control of gas-works, another was penning a letter to a Leeds newspaper asking why the Municipality could not give as cheap a supply as a Company. This person wrote that he had been astounded to find that the Sheffield Gas Company could supply the consumers of Sheffield with gas at 1s. 6d., 1s. 4d., and 1s. 2d. per 1000 cubic feet, and were able at these prices to make a splendid profit and pay regular dividends. Why, he went on to ask, could not the Corporation of Leeds supply gas as cheaply as Sheffield, instead of charging nearly double the price for it? No doubt, if he cares to pursue the inquiry, this writer will learn why—quite apart from any questions of efficiency of management—gas is cheaper in some towns than in others. The Bristol consumer,

who imagines he might gain some advantage if the gas undertaking of his city were under municipal control, may meanwhile usefully ponder over the lessons to be derived from this comparison—a comparison which is not ours--between the cases of Leeds and Sheffield. It will show that, from the consumers' point of view, there are two sides to the question of municipal control.

## Interest of Members in Gas Association Meetings.

It was not the least pleasing feature of the Havre meeting of the Société Technique du Gaz en France that the President was able to thank the members for their regular attendance at the meetings, and for staying till the close of the proceedings, which extended over three days. He said it showed that they had not been attracted solely by the hospitality which was extended to them by the European Gas Company, liberal as it undoubtedly was, but were desirous of manifesting their interest in the business of the meeting. This is as it should be, otherwise justification is afforded for the taunt that the so-called "gatherings of technicians for the discussion of matters of vital importance to the gas industry" are nothing more than picnics on a large scale. It appears from some remarks made by a member of the Western (U.S.A.) Gas Association, that his colleagues in that body are not very keenly alive to their duty as the constituent units of the organization. He complained that there was "a lack of interest —a lull." On one occasion, the President was unable to proceed with the business owing to the difficulty of getting the members together; and a paper which was considered to throw a great deal of light upon the gas industry in America (the one by Mr. Wheeler, from which some extracts are given elsewhere) did not evoke an intelligent discussion. The speaker did not attribute this to inability, but simply and solely to indifference. He thought it was shameful that men should take the trouble to prepare papers with the object of communicating to the members something which they in all probability did not know, and then find the results of their labours received with indifference. This attitude did not result from the fact that the subjects came before the members for the first time at the meeting. The papers were printed and distributed in advance, and therefore opportunity was afforded for the selection of a few points on which to found some remarks. The fact is, however, that if members are not impressed with a sense of their individual responsibility in upholding the position of a technical association, the distribution or non-distribution of papers will not matter very much. If they get them, they will possibly stay at home and read in the published reports of the proceedings what others may have had to say. If they do not get them, this will be made an excuse for refraining from taking part in the discussions. Such an attitude towards their professional work would, as the speaker pointed out, very soon cause managers to lose their positions. We hope and believe that in not one of the Associations of Gas Managers in the United Kingdom is there cause for such a complaint as that made in respect of the American Association referred to. To-morrow, another will be added to the list, and we heartily wish it success. We are quite conscious, as was Cato of old, that this is something which mortals are powerless to command; but, as he reminded Sempronius, they can do more—they can deserve it. This they will do by the earnestness they display in conducting the affairs of their new organization.

## The "Financier" on Gas.

Our contemporary the "Financier"—like the "Financial News," whose article was referred to last week—has devoted a column of its space to a consideration of the position of gas securities as investments; and we are glad to see that the excellent prospects of the industry are realized to the full. It is remarked that in London "the Electric Light Companies seem content with early achievements; and the consequence is that the Gas Companies, under the stimulating influence of the necessity for existence, have surpassed their hitherto more brilliant competitors by sheer force of energy, enterprise, and the incandescent mantle. To-day gas lighting is supplanting electricity on its merits, and is gaining general favour by the greater adaptability of the gas companies." Of course, all this is known to readers of the "JOURNAL;" but we are nevertheless pleased to notice the remarks, coming, as they do, from an entirely independent source. For proof of the improving conditions and prospects of gas companies, our contemporary virtually turns to that most reliable barometer, the Stock Exchange; and, by means of a fairly representative list of undertakings, the tendency towards a higher value exhibited by gas shares during the current year as compared with the two previous years, is amply demonstrated. It is pointed out that this rise is not so much due to increased dividends as to a proper appreciation of the developments of the industry, and the future outlook for gas enterprise generally; and the writer concludes with the opinion that, in view of their prospects, gas shares may be regarded as "safe and improving securities." Some attention is devoted in the course of the article to the recent report of the Gaslight and Coke Company, which, our contemporary says, "is, as usual, written in that querulous tone of the frustrated monopolist which the Company always assume." After remarking on the small decrease in their output of gas, the "Financier" continues: "It would be unfair to tax the Company with laxity of enterprise, having regard to what they have done during the past year or two especially; but when compared with other companies, it must be admitted they still lack just that element which marks the difference between private and official trading. With bated breath we say it, but even now the Company have not fully learned the lesson which the loss of a monopoly should have taught them; for they still cling to the official spirit of aloofness which will often turn the scale with consumers in the choice of electricity or gas as an illuminant." This attitude is contrasted with that adopted by the Chairman of the South Metropolitan Gas Company, "who, realizing that the Company's customers are their supporters, endeavours to make them the friends of the Company by giving them every facility possible, and not waiting to have concessions reluctantly drawn out of them. This is shown in the constant reduction of price, which is now brought down to 2s. per 1000 cubic feet, compared with the 2s. 11d. of of the Gaslight and Coke Company." As the opinions of a newspaper which devotes itself to financial matters generally, and not particularly to gas, these quotations are at any rate of interest.

## A Venerable Lamp Pillar.

An interesting relic of the past has just been discovered at Gainsborough. Mr. Baldwin, the Gas Engineer and Manager to the Urban District Council, has been carrying out a scheme for improving the public lighting of the town, and during the progress of the work he removed some of the old lamp-pillars. One of them was removed to the yard to be renovated, and while it was being scraped it was found to bear the name, J. Malam, and the inscription, "Thorncliffe Iron-Works, 1825." Referring to the discovery, a writer of gossip in a local paper says: "This venerable lamp-pillar, going fast for his century, recalls the inauguration of the gas-works 80 years ago; this being one of the first pillars put up. It is the only survivor of his day and generation in the town; and Mr. Baldwin assured me that it would not be lost sight of in a hurry. But the hoary-headed lamp-pillar is far from being in its decrepitude. Still hale and hearty, it is not destined for the scrap-heap, but has to enter on further service in the public weal, and will perhaps rear its proud head with a brand-new incandescent upon it, honoured in its old age. Anyway, it will be well looked after." The writer of the paragraph wrote to the Thorncliffe Iron-Works, and received a letter from Messrs. Newton, Chambers and Co., in which they said: "This lamp-post would be made by us at that time (1825). J. Malam built the gas-works at Gainsborough, as he did many others in various parts of the country, and we supplied him with the bulk of his ironwork."

**London Statistics.**—According to the fifteenth volume of "London Statistics" (for the year 1904-5), which was issued by the London County Council last Thursday, authority to open the public thoroughfares is possessed (apart from the Post Office, the Council, the City Corporation, the Water Board, and the Metropolitan Borough Councils) by seven Gas Companies, thirteen Electric Light Companies, ten Tramway Companies, the National Telephone Company, the Hydraulic Power Company, and the London Sea Water Supply Company; and the total area of roadway disturbed was 8298 square yards. The rateable value of London is £41,086,974; and £8,939,300 of the total of £30,501,000 paid for income-tax comes from the Metropolis. The Council's debt on March 31, 1903, is given as £65,315,526. The sum paid off during the period 1884-1903 was £28,479,313; but there was also raised during the same period £59,216,098. Thus the debt was increased in the nineteen years by £30,736,785. In the Metropolitan area there are in use more than half-a-million penny-in-the-slot gas-meters; and about 400,000 cooking-stoves are supplied through them. It is not a little curious that of late a number of French 10-centime pieces have been found in the meters.

# PUBLIC LIGHTING.

### Notes from Many Sources of Experience.

[*All Reference Figures in the Article apply to the* "JOURNAL," *and to numbers published this year, unless otherwise specified.*]

INCANDESCENT gas-burners or electricity for public lighting? That is one of the economic questions of the day's municipal politics; and it has reached in several places an acute stage. Public lighting by electricity has been found wanting in sundry ways, but more particularly in respect of economy. Some electricians say that, on this subject, verity is not with the gas industry; the calumny may be thrown back, and by overwhelming proof the mouths of the slanderers may be sealed. Electricians are finding the total costs per annum and the relative costs per mile too heavy for them to bear; and so they dabble in decimal points and candle powers per hour and per annum, so as to mystify the unsophisticated councillor, or with the intent of making him believe that there is something amiss with his mental state because he cannot see that paying (say) £500 per mile for electric lighting is cheaper than (say) £55 per mile for incandescent gas lighting. "Why, it is all so plain," says the electrician, "because we get quite a different story when we pulverize those prices down to five figures the other side of the decimal point, and apply them to candle-power-hours or per candle power per annum, or whatever else you like. But whole figures—let them perish. They are [this aside] too transparent to you business men." But there is the position. For public lighting, gas and electricity are again wrestling; and gas has the advantage on its side, and is not going to lose its opportunity. The ratepayers have found out that the more their local authorities extend electric lighting in the streets, the greater bulks the lighting rate; that, on the other hand, with the adoption of an efficient system of incandescent gas lighting, the lighting rate can be considerably reduced. These are points to the advantage of gas; and, as they recognize them, the trouble is to get the electricians to fairly and squarely "toe the line."

In the desire to be of some assistance to readers in the local controversies over this question that are at the present time being actively indulged in, we purpose in this article, without discussing the matter to any extent (this we have done time after time in the editorial columns and "Electric Lighting Memoranda"), to put them in possession of a number of facts that have already been published in the "JOURNAL," and to give them the necessary references, in order that, whatever use is made of the information, "chapter and verse" may be supplied.

#### THE LOCAL GOVERNMENT BOARD AND STREET LIGHTING BY ELECTRICITY.

The costliness of electricity as a public lighting agent has had one important effect, and that is it has enabled the inquirer into this matter to fairly well sequestrate the prudent municipalities from the prodigal ones. There are numbers of municipalities who have, on the experience of others, declined to adopt for street purposes a lighting agent of proved extravagance; there are others who, though having electricity undertakings of their own, have declined to (having already partially done so) further submit the ratepayers to the burden of an unnecessarily higher rate for street lighting; while there are others of the impolitic kind who place the interests of the ratepayers second in order to those of the electricity undertaking, and go forward in their lavishness. With the former, the Local Government Board have recognized the expensiveness of electricity as compared with incandescent gas lighting for public purposes; and who has a better opportunity than the Board of judging this matter? In refusing a loan for an electric lighting scheme to the Boston (Lincs.) Corporation (April 11, p. 90), the Board made these notable remarks:

> The substitution of electric lighting for the present system of gas lighting in many of the streets would admittedly entail a considerable increase in the public expenditure on lighting; but it was not satisfactorily shown that there would be any material improvement in the lighting of these streets, and, looking to the arrangement of the arc lights shown on the block plan, it is even possible that the illuminating effect of the electric light might be inferior to that of the present method of lighting by gas.

Comment on this would be superfluous. Again, in a letter to the Walthamstow District Council (March 14, p. 719), Mr. H. C. Monro, the Assistant-Secretary to the Board, wrote:

> I am further to state that the charge made for public lighting in relation to the charge for private lighting appears to the Board to be unusually high; and I am to request that they may be furnished with information showing on what considerations these charges are based.

This indicates another aspect of the matter; the ratepayers there being charged too high a price for the benefit of the electricity undertaking. An example of a common remark made by the Board's Inspectors now is supplied by a question of Colonel Slacke at an inquiry at Ebbw Vale (May 23, p. 520):

> The Inspector asked why, seeing that it was a matter of common knowledge that gas for public lighting purposes was cheaper than electricity, the Council had decided to adopt the scheme.

The Local Government Board for Ireland are equally solicitous over this matter. In a letter to the Dublin Corporation (March 14, p. 697), they refer to the fact that the arc lighting of certain streets exceeds the former cost of gas lighting by £7047; and the Board ask this pertinent question:

> Does this heavy burden on the ratepayers secure a proportionate benefit?

The Board themselves answer the question in the negative.

#### SUCCESSES OF INCANDESCENT GAS LIGHTING IN LONDON.

These references are sufficient to show what the Government Department think of the tax upon the ratepayers imposed by electric lighting; and we find in the action of local authorities a large amount of testimony substantially supporting the views of the Board. In fact, this is a case in which "action speaks louder than words." In this connection London must, as the Metropolis, have prior consideration. In the first volume of the "JOURNAL" last year (pp. 328, 392, 462, 524), we gave extensive information as to the then position of arc and incandescent electric lighting and incandescent and flat-flame gas lighting in London; and the result was this instructive table, disclosing the total number and types of lamps in use in the districts of the City and Borough Councils in February, 1904:

| | |
|---|---|
| Electric arc lamps | 4,974 |
| Electric incandescent lamps | 1,185 |
| Incandescent gas-lamps | 56,690 |
| Flat-flame gas-burners | 18,248 |

Extraordinary as were the figures obtained (which, by the way, were kindly furnished to us by the Borough Engineers or Surveyors, and so were authentic), they have undergone considerable changes since. All over London the process of converting the flat-flame gas-burners to incandescent gas-burners has been proceeding; and in comparison electricity has made little headway. In fact, almost immediately after the publication of the figures, the march forward improved them for gas. We have not all the statistics at hand; but Marylebone alone sent the incandescent gas-burner figures soaring up by something like an additional 4000, making for them about 5500 (April 26, 1904, p. 219). Yet Marylebone, with the expenditure to which the Council are committed, have a capital invested in the electrical undertaking somewhere in the region of 2 millions sterling. St. Pancras has also gone in for a further 500 incandescent gas-lamps (Jan. 17, 1905, p. 180); and Holborn only a few weeks since (July 4, p. 55), decided to adapt the incandescent gas system to all their large refuge lamps, as their experience with the ordinary lamps justified this course. These are only a few instances of the progress on the north side of the Thames. As to the south side, this is what Sir George Livesey said at the last meeting of the South Metropolitan Gas Company (Aug. 15, p. 448):

> Flat-flame public lamps in the Company's district now number only 1207, against 21,514 incandescent public lamps. These 1207 flat-flame burners happen to be in parishes which have their own electric lighting installations, and I suppose they are reserving them for electric lighting some day; but we are gradually gaining upon them. Two years ago the number of flat-flame lamps was 3065; last year it was 2486; and now it is only 1207; so that they are gradually disappearing.

This is gratifying progress, showing as it does that, in the competition between the two illuminants, the City and Borough Councils of London have—instead of in any way diminishing the magnificent lead that we proved, eighteen months ago, incandescent gas-light had in the race—added fresh lustre to the figures, and consequently to the accepted economy of this system of gas lighting. Before leaving the former articles on public lighting, it may be useful to readers to mention that authentic statistics for Paris and Berlin were published in conjunction with them, and showed clearly the preference in those cities for incandescent gas lighting (March 1, 1904, p. 525).

The uneasiness that has been caused in electrical circles over the decision of the City Corporation to remove a certain number of electric arc lamps, and to instal high-pressure and ordinary incandescent gas-lamps in their stead, is finding vent in a great deal of exercise on the part of electricians in endeavouring to belittle the City's action. But the City are not spending the money that will be involved without some good purpose. This victory for gas is such a recent one that we need do nothing more here than give the references to the issues of the "JOURNAL" in which full information can be found (Feb. 14, p. 412, May 9, pp. 353, 378, May 16, p. 423, Aug, 8, p. 370). One of the greatest surprises of recent times is the decision of the London County Council to revert to gas lighting (of course, on the incandescent system) on Waterloo Bridge. But there is unusual satisfaction in the decision, seeing that the Council have a heavy financial interest in electricity, as lenders of money to Borough Councils for electricity undertakings, and that they partially supplied the bridge with electricity from their own power generating station. Even so, the County Council have to acknowledge the great economy in comparison with electricity of incandescent gas lighting, although, be it repeated, they generated part of the electricity. The figures, which have not been challenged by the electricians, are to be found in the "JOURNAL" for Aug. 8, p. 371. Aldwych and Kingsway are two important new thoroughfares that incandescent gas-lighting won in a contest with electricity (May 24, 1904, p. 524, and Oct. 25, 1904, p. 279). Parliament Street, it is well known, is lighted by Scott-Snell incandescent gas

lamps; and for Parliament Square (July 4, p. 56 and Aug, 1., p. 332) high-power incandescent gas-lamps have also gained the favour of the authorities. This prominent position was much coveted, lying as it does between the Houses of Parliament, St. Margaret's Church, and Great George Street. A further success is found on the Albert and Chelsea Embankments (July 4, p. 56); and Paddington it is seen are satisfied that it is an economical proceeding to light the front of their Queen's Road Baths with high-pressure incandescent gas-lamps, and to displace electricity inside the baths (July 25, p. 261). It is some time since that we described the incandescent gas lighting installation that had supplanted electricity at the Victoria Station of the London, Brighton, and South Coast Railway (Feb. 23, 1904, p. 465). That installation exceeded the anticipations of saving; and, as stated by Sir William Makins in his address to the proprietors of the Gaslight and Coke Company at their last meeting (Aug. 8, p. 389), the Railway Company have now determined upon incandescent gas lighting for the new Victoria Station. The Wandsworth Borough Council are also continuing to entertain a preference for gas, as is seen by the "JOURNAL" for May 30, p. 602.

### COMPLAINTS OF EXPENSE OF PUBLIC LIGHTING BY ELECTRICITY IN LONDON—THE COST PER MILE.

Of course, all these instances of conversion, or adhesion to incandescent gas lighting, have their being entirely in the unity of economy and efficiency in that system of lighting. Practically throughout London, there has been frequent and caustic criticism as to the flights made in the expenses for public lighting with every fresh adoption of electricity for the purpose; and some examples will serve for proof. Take Islington first (July 21, p. 261). There we find the District Auditor making this significant statement: "Where electric arcs take the place of incandescent gas-lamps, the annual cost to the rates is increased in the proportion of about ten to one." The Finance Committee's comment upon this is humorous in its evasion of the charge and fact: "The question raised by the Auditor as regards the electricity undertaking appears to us to be one of policy, and not altogether within his purview." Whether that be so or not, need not be discussed, as the District Auditor was amply justified by a discussion which took place in the Council shortly afterwards (Aug. 15, p. 452). From it, the following extracts deserve prominence:

> Alderman Tomkins called attention to the £9900 in the estimates for the small number of arc lamps, against the £6900 for a large number of gas-lamps. He said the ratepayers were indignant at the Council taking down the lamps which had been put up by the Gas Company, and which gave almost as much light as the expensive arc lamps. He had seen many of the latter in the Holloway Road out or nearly out. Mr. Crole-Rees referred to the enormous increase in the rates of the borough for the past four years, and to the cost of the arc lamps as compared with incandescent gas. The high rates which were being imposed upon the people through the fad of electric lighting were driving ratepayers out of the borough. This was shown by the number of empty houses to be seen in every street.

Passing across the river to Bermondsey. The ratepayers are very troubled there over the fact that the total cost of street lighting has gone up by some 50 per cent. more than it was in 1901 when gas was the sole illuminant (April 11, p. 81). The Municipal Association have been making inquiry into the matter; and in a report on the subject, they compare Bermondsey with Camberwell (Aug. 15, p. 434), and make a very strong point as to the comparative cost per mile of thoroughfare lighted. An extract from this report is instructive. It says:

> It is generally agreed that the Camberwell area is one of the, if not the, best lighted in London. In the main thoroughfares, burners of 80-candle power are fixed, in the semi-main roads 60-candle, and in all other 40-candle power burners. The entire cost of public lighting for the year ended Lady-day, 1904, as shown in the Council's published report, was £11,752—an average of £90·8 per mile; the figure for the year to March last being lower. During the year ended Lady-day last, Bermondsey paid for gas used in public lighting £3753 and £4738 for electricity, averaging £123 1s. per mile. [Bermondsey has a considerable number of electric incandescent lamps in use.] If the Camberwell system was in operation in Bermondsey, a saving of about £2200 per annum would be effected, with this additional advantage, that there would be a full efficiency of street lighting throughout the night.

The point made here as to the relative cost per mile for lighting is, as every guardian of the public purse should recognize, one of no mean importance. For a moment, let us pass from London proper to the suburbs. In Croydon, there is agitation over the excessive cost of street lighting, owing entirely to the partial adoption of electric arc (with a few electric incandescent) lamps in the streets (Aug. 15, p. 434, and Aug. 29, pp. 550, 570). What the ratepayers are losing—are being compelled to pay, without being allowed a "Yea" or "Nay" in the matter—by the absurd extravagance of a majority of the councillors is shown by a couple of illuminating sentences from the speech of the Chairman of the Croydon Gas Company (Mr. Charles Hussey) at the recent meeting of the shareholders:

> It is probably not known to the ratepayers generally that, while the present annual cost to the Corporation for lighting in the streets lit by gas is some £55 per mile, the sum annually charged in respect of the streets lighted by electric arc lamps amounts to just under £500 per mile. The Directors are satisfied that, if the main streets now lighted by electricity were lit throughout by modern and improved gas-burners, the town would be fully as efficiently, or better, lighted; and a saving would be effected equal to about a penny rate, or £3738 per annum.

Complaint is also made at Stepney where the Council take from the ratepayers for public lighting about a quarter of the earnings of the electricity undertaking (May 16, p. 421); and at Poplar, as we showed in April last (p. 150), some of the councillors are not able to see where the prudence comes in of paying about £7000 more for public lighting by electricity than in the days of gas-lighting, and yet only obtain from the electric lighting undertaking (according to the accounts published previous to the date mentioned) a net profit of less than £3000.

What Mr. Bradley says, in his Westminster reports, is often quoted by hard-pressed electricians when this subject of public lighting comes up for discussion; but what the Westminster City councillors say (who have to look at the matter from the £ s. d. point of view) is equally important. The Council have shown, looking at the matter from the standpoints of economy and efficiency, a distinct liking for incandescent gas-lamps. Aldwych is an example; and so is their contract with the Gaslight and Coke Company for other high-pressure gas lighting (Feb. 14, p. 446), together with considerable areas of gas-lighted streets, compared with which electricity makes but a modest show. Electric lighting has obtained one success in the City of Westminster of late; but though there has been a deal of bragging over it, it is of little consequence, seeing that it was not thought of sufficient worth, on account of its comparatively small extent, over which to fight the whole question of Electricity *v.* Incandescent Gas Lighting. The 66 electric lamps in that instance were already installed; and the West-end shopkeepers lining the streets in which these lamps are situated had a fancy for having them continued. The words of the Local Government Board for Ireland as to the disproportionate benefit conferred by electric lighting on the ratepayers of a district recur to mind; and the question arises, Why should not these shopkeepers meet the extra expense of their preference for electric lighting, until they recognize the possibilities, or rather the actualities, of gas? Of course, the revenue from the public lighting (paid by the whole body of ratepayers) assists the Electric Lighting Company to provide electricity for shop lighting at a cheaper rate. The West-end shopkeepers are selfishly wise in a way. For them the electric light is largely the vogue; and while their own pockets can benefit in the matter of lighting costs at the expense of the ratepayers generally, so much the better for the wily shopkeepers. However, bowing to the entreaties of these shopkeepers, and considering also that, to secure a saving by adopting gas lighting on the scale that would be necessary, there would be an amount of capital expenditure involved (though the Gas Company offered to spread this over a term of years), a majority of the Council continued electric lighting in the streets in question (June 6, p. 733, and July 18, p. 184). But this was not done without a strong protest on the part of Mr. Alderman Emden, Mr. Dennis, Lieut.-Col. Hill-James, and Captain Jessel; and even Mr. Spencer-Smith, the Chairman of the Works Committee, "did not mind saying that he favoured gas in preference to electricity." Apparently there are councillors in the City of Westminster who are not so smitten with reports of tests by peripatetic photometers as are some electricians who are at their wits' end to devise further means for proving—abstruse calculation failing—that electric lighting, which costs three or four times up to nine or ten times as much as incandescent gas lighting per mile of street, is the cheaper system. We have heard that there are people who, if need be, are willing to asseverate that black is white. The attention of gentlemen who are prepared to make a somewhat similar assertion regarding the subject under notice is invited to the instances of public discontent of which mention has been made in this article.

### FROM THE PROVINCES.

Complaint is not peculiar to the Metropolis respecting the cost of electric street lighting. The cry of excessive cost has been heard in many places. For instance, Bath (Jan. 10, p. 113, and April 4, p. 21), Bury St. Edmunds (April 4, p. 21), Cardiff (Feb. 28, p. 592), Chester (March 7, p. 631, April 4, p. 21), Hartlepool, (July 11, p. 137), and Monmouth (April 4, p. 21); and a local newspaper recently called public notice to the relative cost at Hastings (May 23, p. 494). The existence of discontent over the expense, and the extortion practised upon ratepayers by the adoption, of electric street lighting has been so amply proved by what has gone before in this article that investigation need not be extended. But if the principle of the force of example has application in civic affairs, then it may be useful to direct attention to what is being done in Liverpool. That city owns its own electricity works; but, in its wisdom, the Council have only adopted 207 electric lamps, as compared with 13,874 gas-lamps. The total length of the roads of Liverpool lighted at the end of the year (irrespective of passages and courts) amounted to 441½ miles—only 4½ miles being lighted by electricity, 426½ miles by incandescent gas, and the remaining 10½ miles (back streets) by the ordinary flat-flame system. This is an eminently satisfactory testimony for gas. The latest figures as to the progress of illuminating power and the reduction of costs since incandescent gas lighting has been so largely applied were given in the "JOURNAL" for April 11, p. 117. Glasgow again owns its own electricity works; and well conducted they are. But for street lighting the Corporation in 1904 (March 15, p. 713, and April 5, p. 45)—on the advice of a Committee who were impressed, as

the result of a tour of inspection, with "the almost entire unanimity of opinion in regard to the advantage to be gained by the adoption of the incandescent system of gas lighting for street illumination"—determined upon applying the system to all the city streets where electric lamps were not installed, in preference to extending the electric lighting. The electricians, too, fail to get the Sheffield City Council to abandon economy, and give their support to their own electricity undertaking (June 27, p. 941, July 25, p. 261, and Aug. 1, p. 300). Other information as to experiences in Yorkshire may be gathered from the "JOURNAL" for Jan. 10 (p. 84). What is happening at Bristol is brought out in very striking relief by the Chairman of the Gas Company, Mr. Dix, at the last meeting of the proprietors (Aug. 22, p. 510), when he said:

> Over 1200 gas-lamps had discontinued consuming gas, equal in amount to £3100 per annum. Last year the electric lamps which displaced gas cost the city £9900, showing an excess over gas of £6800 per annum, in addition to capital expenditure. Had incandescent gas-light been used, the difference in price would have been larger. Should the authorities, in their wisdom, or unwisdom, displace the rest of the gas-lamps, and adopt electric lighting for the whole of the city, the extra cost—calculating at the same rate as the present installation—would, in addition to the above, be £34,000 per annum, or a total of £40,800 per annum. This was a matter for the ratepayers to watch.

Reports by the Newcastle-on-Tyne Public Lighting Inspector are also distinctly favourable to incandescent gas lighting, showing, as his figures do, that it is not impossible, by means of this system, for efficiency to be accompanied by cheapness (March 14, p. 697, May 30, p. 598, June 13, p. 792).

We have brought together these facts in the belief, judging by communications received from various quarters, that such a compilation will be helpful at the present time in connection with the controversy that has been raised in many places, through shameless indulgence in prodigality in the matter of street illumination to support municipal electricity undertakings. A great politician once said that it was the business of a Government to govern and not to trade. We would apply that to municipalities, and add that, if they do trade, then the trade should not impose, either directly or indirectly, a burden upon the ratepayers. And that, our evidence goes to show, public lighting by electricity unquestionably does. It is upon the ratepayers a heavy indirect tax for the benefit of the electricity business.

## THE GAS STOCK AND SHARE MARKET.

**(For Stock and Share List, see p. 644.)**

THE Stock Exchange has been more or less under the influence of the peace concluded between Russia and Japan. The City has been on the whole optimistic during the negotiations; but the announcement that an agreement had been arrived at so soon on all points came as a surprise, for it was not expected that the Japanese would have withdrawn the demand for an indemnity. The result was that operators for the fall rushed in to cover commitments; while there was a good amount of professional buying, causing a general advance in all departments. Consols rose $\frac{7}{16}$, touching 91½ at one period, but subsequently receded on the monetary outlook. Fears are entertained that both Japan and Russia will require to strengthen their financial position at home by drawing on the European markets for gold. Thus discount rates are well maintained, though the rate for day-to-day loans keeps fairly easy. The demand for investment securities was increased during the week, and a fair inquiry prevailed for Gas Stocks—quite a number of this class of securities being quoted higher. Gaslight and Coke issues were again in some request; the dealings in the ordinary stock ranging between 99½ and 100⅝, most of the bargains being between 100 and 100½. The 3½ per cent. maximum stock was likewise inquired for and improved; the business being done up to 93. South Metropolitan ordinary was also in request and rose—business being done at 133; the debenture issue being unchanged. Commercials are now quoted *ex div.*, and the market has been quiet. Among the Suburban and Provincial group, Brentford consolidated rose three points, to 250-255, and the new stock to 190-5. Bromley "A" has also been advanced 2, to 119-23; and the "B" stock 1 to 89-93, without, however, showing any record of business. South Suburban ordinary is up to 122-5 or a rise of 2, and the 5 per cent. preferred three, to 125-130. West Ham ordinary is better at 103-5; while business was recorded in the debenture stock at 108. Southampton ordinary has also improved two points to 111-114. Business in the Continental and Foreign groups has been fairly active. Continental Union has risen 5 to 114-117, business being recorded up to 116; and the 7 per cent. preferred changed hands at 141¾. Imperial Continental stocks also met with support; the ordinary advancing to 215-217, and the debentures to 96-98, business being recorded in the former at 215½. In other stocks of more distant undertakings, Buenos Ayres showed some improvement, being quoted 12¼ to 12¾; but the most activity was in River Plate, up to 13⅛ being paid for some shares. Malta, Primitiva ordinary and preferred, and San Paulo also met with attention, and rose ¼; while Monte Video improved ½. The week closed with a good tone in all gas securities.

## MR. BRACKENBURY ON BRITISH PROGRESS IN GAS-WORKS' PLANT AND MACHINERY.

No introduction to Mr. Brackenbury is needed by our readers. He is already well known as the author of an interesting work on "Modern Methods of Saving Labour in Gas-Works," and also for his observations on more than one occasion upon British as compared with Continental practice in the construction of gas-works. One might almost have imagined him to be in favour of the latter; but, in the book before us,* he appears as a thorough-faced Britisher, endowed with a very becoming sense of British superiority. This book forms the third volume of a series of National Engineering and Trade Lectures (the first of which has already been noticed in our columns), undertaken, as the prospectus informs us, with the primary object of showing "Colonial and foreign buyers what progress Great Britain has made up to the present time in the manufacture of all classes of machinery and goods." It is a model of what such a book ought to be; well printed upon thick paper in clear type, and profusely illustrated, largely from photographs. It is needless to say that Mr. Brackenbury has done his work extremely well; and save for a very few noticeable omissions, it will be found a reliable encyclopædia of the subject of which it treats.

The object of the author is not to criticize, or to institute comparisons between one form of apparatus and another, but rather to bring under the notice of intending buyers the various forms of apparatus available; and his Continental experience has enabled him to assert—which he is by no means backward in doing—the great superiority of British over Continental gas-making appliances. The book is, in fact, a refutation, as regards the gas industry, of the pessimistic views which have been somewhat freely indulged in during the last few years, as to the course of British industry. It indicates, indeed, an activity in all branches of our own particular industry, of which every one connected with it may well be proud, and justifies to the fullest extent the author's concluding remarks, that there is no need to be fainthearted and pessimistic as to the future. "The gas industry," he says, "is by no means moribund, nor are its engineers asleep. . . . It only remains for our parliamentary legislators to give it fuller freedom from needless restrictions, for our engineers to live up to the traditions of their past, to 'halt not in their ways,' and British progress will be as certain and as rapid in the future as of old." With all this, we cordially agree, and believe, moreover, that much of it is capable of far wider application—namely, to British industry generally. There is, however, no disguising the fact of our indebtedness to the Continent and also to America for ideas and invention. Nor need it be disguised. Interdependence is as natural among nations as among individuals. All have their special characteristics; and it may almost be said, their special resources. Mr. Brackenbury pays a well-deserved tribute to the readiness of English engineers to adopt new ideas and methods, and endeavour to improve upon the originals. This is well exemplified by his reference to the original Coze arrangement of inclined retorts, and the successful adaptation of such retorts in this country. He might also have mentioned the indebtedness of the entire gas industry to our German *confrères* for their introduction of the continuous regenerative gas-furnace, which is now so extensively used for the heating of gas-retorts. It would have cost him little, moreover, to have acknowledged how much the world owes to Herr Otto for the development of the modern gas-engine.

The laudable way that our author makes manifest—at least, to his own satisfaction—the superiority of everything British, is in marked contrast to the somewhat halting way in which he refers to the origin of the art of gas lighting. This, he says, is of international origin. We are not so sure of this. It is true that Minckelers made small quantities of gas from coal, in the course of his researches for a gas suitable for ballooning purposes; and that he may have lighted this gas in his laboratory for the edification of his students seems likely enough. But this is little more than Dr. Clayton had done, many years before, when he lighted the gas which was stored in his bladders, for the amusement of his friends. There is not a tittle of evidence to show that Minckelers actually utilized his gas for lighting purposes; and he lived for many years after the experiments in question, in the active pursuit of his profession, without, so far as is known, any further development having taken place. Again, although Lebon is credited with having made experiments in the distillation of gas from wood at his father's house at Brachay, near Chaumont, and indulged in dreams of lighting all the way to Paris with it, nothing was heard of his "Thermolamp" until many years afterwards. The patent for this was taken out in 1799 or 1800; and it can hardly be without significance that a prior patent, taken out by Lebon, was for an entirely different object. Moreover, Lebon's "Thermolamp" died with him, if not before him; whereas Murdoch's system, as soon as it was taken up by Messrs. Boulton and Watt, became speedily established, and was the real commencement of the enormous development of gas lighting all over the world that has since taken place. It is not, therefore, for any Englishman to doubt that the true originator of gas lighting

* "British Progress in Gas-Works' Plant and Machinery." By C. E. Brackenbury, Assoc.M.Inst.C.E., &c. London: Archibald Constable and Co., Limited; 1905.

was William Murdoch, any more than it is for him to question the superiority of British manufactured gas plant.

In connection with the transport of coal by rail, reference is made to the use of hopper waggons; but there is no mention of the latest of these, devised by Messrs. Hunt and Shackleford, and largely used by the Birmingham Corporation. This waggon is made entirely of steel, and is provided with a sliding-door, having suitable gearing for opening and closing. The waggons are discharged of their entire contents in a few seconds of time, and with a minimum of effort on the part of the workmen employed. Under the heading of "Coke Plants," also, space might have been found for some reference to the very complete coke-screening arrangements which have been in use for some years at Lower Sydenham, Birmingham, Nottingham, and other places; while of the gas-tube industry, which had its origin in Staffordshire, and has grown to gigantic proportions, not a word is to be found in this volume. At the same time, the book is creditably free from any appearance of advertisement, though it is not very easy to understand why the locomotives made by one firm should have been specially selected for illustration, or why, when speaking of the "Whessoe" washer-scrubber, it should be asserted that the guarantees of the makers are fully applicable for any size up to 10 million cubic feet per day—this being a size which, so far as we are aware, has not yet been approached, except in imagination. If we are mistaken as to this, our criticism falls to the ground.

A very complete classified list of British gas engineering literature, and also one of British firms manufacturing gas-works plant, greatly adds to the utility of the work, which cannot but prove of much service to all buyers of gas plant, whether at home or abroad. Indeed, we heartily commend the book to all who are in any way interested in the advancement of the gas industry, notwithstanding the special purpose for which it has been written and similar volumes are being prepared—to spread knowledge of the progress in the technical work of the great industries of our country.

## DETERIORATION OF BOOKBINDING LEATHERS.

We have received from the Library Supply Company an interesting book bearing the title of "Leather for Libraries," which they have published for the Sound Leather Committee of the Library Association. It will be within the recollection of many of our readers that the old-time detractors of gas never lost an opportunity of condemning its use in public and other libraries on the ground of its alleged injurious action on the leather bindings of books; and more than sixty years ago the subject was investigated by Professors Faraday, Brande, and others, on behalf of the Athenæum Club. The result of their investigations was the starting of the "sulphur in gas" theory, which held its ground for a long time, owing mainly to the eminence of the men who had propounded it. The subject is referred to in the first chapter of the book under notice, in which Mr. E. Wyndham Hulme deals, among other things, with the degradation of leather. He points out that the theory referred to was never wholly true, "even at a period when the percentage of sulphur in coal gas was very much higher than it is at present;" and he says it has now "ceased to have any practical bearing upon the matter." This was very much the contention of the "Journal" in the early years of its existence. Mr. Lewis Thompson, in the trenchant style for which he was renowned, poured scorn upon the "oil of vitriol bugbear;" while the distinguished chemist, Mr. Crace Calvert, of Manchester, ventured to differ from the learned Professors named above. This gentleman adduced one fact in disproof of the assertion that gas was the principal cause of the decay of leather bindings, and that was that it was observable in libraries where this illuminant had never been used. He attributed the presence of sulphuric acid in leather bindings to one or more of three causes: (1) Pollution of the atmosphere by the consumption of coal in factories; (2) absence of ventilation in gas-lighted rooms; (3) the use of sulphuric acid by the tanners. He further expressed the opinion that the seat of the disease would be found in irregularities in the processes of tanning; and consequently the first two causes were really aggravators rather than originators of the trouble.

Of course, as Mr. Hulme remarks, Calvert's views had very little support. He was but as one crying in the wilderness. In 1887, some experiments on the action of gas fumes and heat were undertaken on behalf of the Birmingham Library by Mr. C. T. Woodward; and Mr. Hulme gives some particulars in regard to them. Strips of leather exposed for 1000 hours to the action of gas fumes, at temperatures of 130° and 140° Fahr., showed a mean absorption of sulphuric acid of 1·78 per cent., accompanied by a marked reduction in their stretching capacity and breaking strain. The experiments on the action of heat alone were inconclusive; and nothing more was done. The subject was not, however, lost sight of; and towards the close of the last century an agitation in favour of standard leather was set on foot by Lord Cobham, Mr. Cockerell, Mr. Cyril Davenport, and others, which resulted in the appointment by the Society of Arts of a Committee on Leathers for Bookbinding. The report of this Committee was noticed in the "Journal" for Aug. 6, 1901; and their conclusion was quoted to the effect that the bookbinder must share with the leather manufacturer and the librarian the blame for much of the premature decay of leather bindings. As a matter of fact, it is the manufacturer who is the chief offender; for when once sulphuric acid has entered a leather, it can never be got out again. Where bindings contain free sulphuric acid to begin with, their decay is only a question of time, whether they are exposed to the fumes of gas or not. The great point is to have adequate ventilation; and, as Mr. Hulme says, inasmuch as the percentage of sulphur in gas is now very much less than it was fifty years ago, it may be regarded as almost a negligible quantity so far as having a deleterious effect on bookbindings is concerned.

## ELECTRIC LIGHTING MEMORANDA.

**Transfers of Local Authorities' Powers — Local Authorities as Bankers—Cooking and Heating by Electricity—Room for Invention and for Agreement as to Costs—An Unscrupulous Communication—Libraries and Fires.**

The refusal of the Local Government Board to grant loans in certain recent cases for electricity supply to local authorities has, it transpires, been partly due to a revision by the Board of Trade of their policy. This does not apply in all instances, as there are those on record in which the Local Government Board have expressly declared their opinion that proposed undertakings would not be in the interests of the ratepayers. But it is those cases that come within the first category with which we are now concerned. Ormskirk and Wisbech are examples; and in these cases the authorities, having electricity powers, entered into agreements with the National Electrical Construction Company, the design of which agreements was that the Councils should find the capital, the Company should put down the works, operate them, take the revenue, pay expenses, sinking fund, and interest, and pocket the profits—if any. Of course, the Company shoulder the whole risk; and the Local Authority retain the right of taking over the undertaking at the end of certain periods. It will be considered by most people altogether wrong in principle that local governing bodies should be allowed to constitute themselves bankers for trading companies, and on their behalf pledge the credit of the ratepayers. Of course, these construction and operating companies make a good profit on the installation of the works; but with the ever-extending ramification of their speculations, who can tell what may happen to them? The trouble between such local authorities and the Local Government Board has come about in a way that is shown clearly by correspondence that has passed between the Ormskirk District Council and the Solicitors to the National Construction Company.

Time was when local authorities obtained Provisional Orders and regarded them as good negotiable property, and in certain cases treated for and effected a sale. The Board of Trade some years ago put a stop to this traffic, by withholding powers of transfer save in exceptional circumstances. This withdrawal of a specific power should have sufficed to show that agreements such as that of Ormskirk, Wisbech, and other places, could not be made under the terms of section 11 of the Electric Lighting Act of 1882, which, as we stated when lately dealing with the Sudbury case, specifies clearly that "no local authority, company, or person shall, by any contract or assignment, transfer to any other company or person, or divest themselves of any legal powers given to them, or any legal liabilities imposed on them by this Act, or by any Licence, Order, or Special Act, *without the consent* of the Board of Trade." But agreements of the class in question have been made and given effect to, until the Local Government Board lately raised the question as to the consent of the Board of Trade to transfer being a *sine quâ non* to the granting of borrowing powers under the circumstances. Opinions run contrary as to whether the consent of the Board of Trade is necessary, in view of the opening portion of the clause of which we have quoted the closing words above. But the Board of Trade are omnipotent in the matter; so we need not bother ourselves about what other people think. The closing words of the clause appear so explicit that it is difficult to see where the doubt comes in. However, the two central Boards have been in consultation over the matter; and the policy the Board of Trade have adopted now—showing means by which local authorities can get relief from the new-found disability—is fairly well defined by a letter addressed to the Frome District Council, who have an agreement with Edmundson's Corporation. In the course of the letter, the Board announce that they will be prepared to consider an application for their consent to a deed of transfer, provided it be understood that the Board reserve to themselves the right to settle the terms of the deed; but preceding this, power to transfer must be secured. Apparently, therefore, it will only be a question of a special power of transfer being procured to allow of local authorities continuing to finance these electrical construction companies; for really that is what the procedure amounts to. It can only be hoped that, under these peculiar circumstances, the Board will see that ample protection is secured for the ratepayers. It may be supposed that what applies to arrangements which practically enable local authorities to divest themselves of their powers in favour of these private construction companies, will apply to similar agreements with power companies.

Being the dull season in journalistic enterprise, the question of cooking and heating by electricity has been unearthed from the archives, and the record brought up to date. Having diligently

read all that has come before us, it is our duty to report that the *status quo* has been maintained, and that there is no present intention of making any change in the headline to the "Memoranda." Following the day of the eclipse of the sun last week, the "Daily Telegraph" came out with an article on the subject; but it was one of those articles that leaves the general reader in a quandary as to whether or not the great day is nearer at hand when even the application of a match will not be any longer necessary to obtain heat for the house and for culinary operations. The writer in our daily contemporary was wise in letting a non-committal attitude be the dominant feature of the article. He tells us that persons of moderate means must be patient; and that there is room for invention before the general adoption of electricity for our cuisine takes place. That is delightfully clever. For a paper to publish what has been known as the truth for the past quarter of a century is perhaps appropriate to the "silly season," and equally as informing as would be the assertion that Ludgate Circus is at one end of Fleet Street. This electrical cooking and heating question is one of the concerns of life to which the patience of an anxious public must be of an inexhaustible nature, at the pace events have been going, seeing that the room for invention has such a mighty vastness that the fresh inventions as they come along are quickly lost in it again. But still there is one trace of hopefulness in the writer, because he says that there is no doubt "we are in sight of remarkable developments." Of their nature no indication is granted; but the words have hardly escaped his pen, when he modifies them by asserting that "at present cooking by electricity is a luxury." We cannot quarrel with him in his transparent attempt to make the best of an ungracious outlook. It is, however, gathered that, in connection with the coming Electrical Exhibition at Olympia, inventors are to be encouraged to once more set their fertile brains to work in order to win a prize for an electrical cooker. Germany and Switzerland should be in the running; for, though we are told there is room for invention, later on there are hints as to wonderful success having been achieved in these countries. When a daily newspaper writer finds he has a bad case, he is pretty safe in referring to the great happenings abroad. But the thinking man naturally asks himself the question, if in Switzerland and Germany, why not here?

The electrical cooking and heating stoves that are to compete with gas-stoves are not here yet; and intelligent electricians do not entertain any idea of successful competitors being discovered. Accompanying the want of the necessary appliances, is the question of cost. In the "Telegraph" article, a "well-known maker" of electrical appliances is credited with stating that the electrical cooker can only claim an "absolute advantage" over ranges heated by coal when the unit is charged at ½d. But the "well-known maker" must have been wandering when he went on to say, after making the statement, that taking current at 1½d. per unit, the electric range scores over gas or oil. We will not comment on this, as the same gentleman later on "estimates" 3½ units of electricity as the required consumption per day for the cooking for a family of four. Accord in opinion is one of the things upon which we have ever failed to find an opportunity of congratulating our electrical friends. The "Electrical Review" publishes some American views on this subject of cooking and heating by electricity; and comparative prices cannot be got to square with each other. One contributor quotes 4 c. per unit of electricity as comparing with gas at $1·50. Again we find consolation, as gas is not generally distributed in this country at anything like so much as $1·50, nor electricity for heating at anything like 4 c. Even if the latter was under that price, gas would not "shy" at it. Another contributor computes 3 c. as being equal to gas at $1. It would have been rather more satisfying if the writers had vouchsafed a little practical information as to the heating capacity of a given amount of gas, and its equivalent in cost of electricity. Reading between the lines, however, in America, such electrical cooking and heating appliances as they have are not being rushed after; but curling-irons and little domestic conveniences of this kind are reported to be a better branch of business.

The "Electrical Review" is much of our way of thinking on the possibilities of cooking and heating by electricity, as is seen in an article of peculiar composition on "The Natural Field for Coal Gas." The article starts with a humorous comment on the speeches at railway companies' meetings, then gives quotations from the speeches of some railway company chairmen as to the reduction in coal traffic through the increased use of oil by gas-works, and the diminished consumption of coal by householders owing to the progressing adoption of gas for cooking and heating; and finally there is an amount of prophecy to which we give more credence than to the vapourings of the gentleman in the "Telegraph." We may quote from the "Review" the only point we wish to make:

> The time is not yet when electricity will offer any serious competition to gas for heating purposes; and until that time arrives at least, the consumption of gas of some sort, but almost undoubtedly of the nature of water gas, will be affected only for good by the advance of electricity for domestic, factory, and other uses. It is to the increase in gas consumption that we have to look even more than we look to electricity for the gradual dissipation and eventual disappearance of the pall of smoke which overcasts our once fair land; for it is from gas that electricity itself will be transmuted.

In other words, the writer believes that "our children," to obtain their electricity will tap the gas-main for the gas-engines, as well as for the whole of the heating and cooking apparatus There is one statement in this article that we think the Editor of the "Review" wishes was true, rather than believes that it is; for he states that gas as an illuminant has become less popular than electricity, and will become still more unpopular, until in the end it ceases to be used for lighting altogether. After all, it is a harmless statement, in face of the concrete facts which are being multiplied daily as to the deposing of electricity in private lighting, and the drag that has been put upon it by incandescent gas lighting for public purposes.

In the suburbs, the Electricity Supply Companies are very active just now in canvassing, circularizing, and taking other steps for advertising their readiness to enter into business relations with householders. They even tack up on the "To Let" or "To be Sold" boards of empty houses neat little notices that the electric light is available, though the nearest point of availability may be a far-off cable in the road. Little sops are also held out to householders in the form of the free fitting up of a modest number—say, some half-dozen—low-power lamps in a house, on condition that there is a certain minimum consumption of electricity in a certain period. These lamps are just sufficient to show where numerous others are required if the householder and his family do not wish to sit in darkness after daylight has vanished. This is all very good, and such energy must be praised, as electricity suppliers until recently were not renowned for special resource in cultivating business. But the South Metropolitan Electric Light and Power Company are carrying the game too far when to a consumer—and possibly to others—innocent of the thought of adopting electric light, a letter is sent which informs him that "we have a record in this office of the Company's representative calling upon you some time since, when it was understood that you contemplated adopting the electric light at your residence." Such a method of trying to get business will make householders wary of the Company.

A great deal used to be heard about the damage that gas was alleged to be responsible for in libraries, until the Birmingham report of Dr. Percy Frankland did something in the way of stopping the croakers. Gas was in those days blamed for much that was afterwards traced to changes in the method of manufacturing leather for bindings. But better the destruction of book bindings, than the complete loss of libraries by fire. At the recent annual meeting of the Library Association, at Cambridge, Mr. Welch, of the City of London Guildhall, raised the question of protection from the fusion of electric lighting wires; and he mentioned that, after the disastrous fire at Turin, they had had their own wires examined, and found the whole system required to be rearranged. It was, however, denied by the President that the Turin fire was caused by the fusion of wires; and he attributed it to the idiotic conduct of a member of the staff. Even if this was the case, Mr. Stanley Jast, of Croydon, was able to inform those present that the wiring at his library had fused twice—once in the daytime, and once at night. This cannot be regarded by those in charge of valuable libraries as a cheerful state of affairs.

## OBITUARY.

We regret to announce the death, on the 14th ult., of Mr. Izaak Walton, formerly Chief Accountant of the Imperial Continental Gas Association. He entered the London office in 1843, at the age of 16, and retired in 1897, after 54 years' service. His father, Mr. William Walton, was Secretary of the Association for 28 years.

We regret to learn that Mr. Charles Read, who relinquished a few weeks ago the position of Secretary of the Redhill Gas Company, which he had held for 33 years, has not lived very long to enjoy the leisure he had justly earned. It may be remembered that his retirement was necessitated by the serious condition of his health, which had given cause for anxiety to his friends for upwards of twelve months. In May last he decided to consult a specialist; but unfortunately he was unable to obtain permanent relief. His painful illness subsequently took a serious turn, and he passed away on Wednesday—just one day before the termination of his official connection with the Company—at the age of 67. The funeral took place at Reigate Cemetery on Saturday afternoon.

Mr. C. E. Jones, who was for a period of 25 years Engineer to the late Chesterfield Water-Works and Gaslight Company and has latterly been in practice as a Consulting Engineer, has been appointed agent for pipes and castings by the Staveley Coal and Iron Co., Limited, of Chesterfield, and 34, Victoria Street, S.W. Mr. Jones took over the duties of the office on the 1st inst.

A small party, representing the brass-work industry of Birmingham, recently paid a visit to Berlin, "for the purpose of inquiring whether the brass-workers in that city have succeeded in attaining a more desirable physical and industrial life than that led by the brass-workers of Birmingham." One of the party was Mr. R. H. Best, of Messrs. Best and Lloyd, Limited. They have issued, through Messrs. P. S. King and Son, a joint report on the result of their investigations; a decided opinion being expressed in favour of Berlin on almost every point submitted to comparison.

## COST AND EFFICIENCY IN STREET LIGHTING.

By G. S.

One of those controversies which are never ending in towns where municipal electricity undertakings are in competition with gas-works owned by companies, is being carried on through the columns of one of the Bristol newspapers. It seems to have arisen out of some remarks made by Mr. J. W. S. Dix, the Chairman of the Bristol Gas Company, in which attention was directed to the price that the ratepayers of the city are paying for the luxury of lighting certain streets with electricity. Mr. Dix pointed out that the electric lamps in the city are costing the ratepayers £6800 per annum more than the gas-lamps they have displaced, and that if the Corporation now extend electric lighting over the whole of the city, the total increase in the cost will be no less than £40,800 per annum.

This statement drew from Alderman Pearson, the Chairman of the Electrical Committee, one of those weird calculations by which the advocates of electric lighting seek to prove that their method of illumination is, or might, should, or could be, cheaper than gas. What it all comes to is that, if one electric lamp is taken as the equivalent of six gas-lamps, electricity is the cheaper illuminant. One electric lamp of 1000-candle power costs, he says, £8 5s. 10d. per annum; while for gas for six lamps of 75-candle power each, the cost is £8 7s. In the one case there is the equivalent of 1000 candles; in the other, the equivalent of 450 candles. "The simple fact is," adds Mr. Pearson, "that it costs more to light the streets by means of electricity because you have so much more light. If you want the usual ill-lighted street, you can have it for a small sum by the aid of gas. If you want a well-lighted street, you can have it by means of electricity; but it will cost you more money, although comparing the light, candle for candle, electricity is the cheaper of the two." Could anything be simpler? All one has to do in Bristol or anywhere else is to sweep away six gas-lamps which are evenly distributing the light over a given area, and put up on a high pole an electric lamp which will give a light that is more or less equivalent to double the intensity of the whole six gas-lamps combined; and there you are. If this is not satisfactory and you find that, in order to obtain equal lighting effect to that given by the gas-lamps, you have to put up another electric lamp, you double the cost—that's all!

In the particular case of Bristol, it is interesting to note—as is pointed out by one of Mr. Pearson's critics—that the Corporation are now busily engaged in economizing in street lighting, not by lessening the cost of the electric lights, but by substituting smaller incandescent burners for the large "Kern" burners in the gas-lamps. When this has been accomplished to the satisfaction of advocates of the electric light, they will be able to point, with a still greater air of triumph, to "the usual ill-lighted streets" away from the main thoroughfares of their city.

It is unfortunate for the ratepayers of Bristol—as it is for those of many other places—that gas and electricity are not allowed to compete on anything like equal terms. In order to give the electric light the better showing, the Corporation make the most of it, and endeavour to extract from it the best results it is capable of producing. The Gas Company, on the other hand, are restricted to the mere supply of gas. They have no control over the lamps, burners, or mantles; and if the one or the other is unsuitable, and the result unsatisfactory, they cannot remedy it. Where the two have "a fair field and no favour" there is no question which is the cheaper or better means of lighting. It is well-nigh hopeless to expect that any such fair field will be found in a town where the electricity works are owned by a corporation and the gas supply is in the hands of a company. In a case of this kind, which is the case of Bristol, it is only a question of how long the ratepayers will continue to pay an exorbitant price for the lighting of certain streets by electricity, and whether they are prepared to see the rates indefinitely increased in order to afford this indirect support to the electric light works.

## ELECTRO-CHEMICAL ACTION AND CONDENSING GAS-STOVES.

By F. R. E. Branston.

In the "Journal" for Aug. 2, 1904, an account was published of a paper submitted to the congress of the Sanitary Institute at Glasgow, by Dr. Samuel Rideal, F.I.C., on the "Hygienic Significance of Sulphur in Coal Gas," in which he described how he obtained the maximum corrosive effect on iron, by the sulphur produced by the combustion of coal gas, by measuring the quantity of water, sulphur acids, and iron, in the condensed water of a condensing gas-stove, in London and elsewhere, under similar conditions.

Dr. Rideal showed that the iron oxidized was generally directly proportioned to the sulphur, and approximated to 56 parts of iron to every 32 parts of sulphur; and that it was attacked in atomic proportions. This is interesting, as pointing towards the results of the condensation being brought about by electro-chemical action. In previous articles in the "Journal," I have explained how the action of condensation is caused in these stoves; and I now submit the effects which may cause electro-chemical action to produce such regular results.

If a gas-stove of the same size as that used by Dr. Rideal be taken when cold and not in use, and a compass be held near to it, the side columns will be found to be magnetized; and on the compass being moved up and down parallel with them, the needle will be seen to be attracted to one half, and repelled by the other half. If the gas is ignited and the stove put in action, the polar points will be considerably changed as the iron becomes heated—showing that electric currents can be produced in iron by an unequal temperature of its different parts, when it is traversed by currents of low intensity but of considerable quantity. The alteration of the polar points in the iron will continue to increase for about two hours, when in all probability from about 3 to 4 oz. of water will suddenly fall into the pan below the stove; and on the compass being again applied to the columns of the stove, the needle will show that the polar points of the iron soon resume their normal condition. This will then be found to take place at regular intervals of about one hour between each discharge of water from the stove; and it is probably caused in the same manner as the experiment by Lord Rayleigh, when he showed that feeble electric charges in the neighbourhood of fine rain or a spray of water, cause the small globules to collect and join into large globules, and fall like a thunder shower. According to the writings of Leithead, whenever a body is heated, it parts with electricity and, *vice versâ*, when a body is giving out caloric it absorbs electricity. Hence it may be inferred that the natural quantity of electricity in a body is continually varying with the temperature of the air, or in consequence of other sources of heat affecting its calorific state.

The natural galvanic combinations were considered by Sturgeon to be those existing naturally in the same piece of metal, and that they are brought into play when the metal comes in contact with a fluid medium, suitably adapted to promote their energies. Natural galvanic circles are then formed, the energies of which cause chemical action. Considering that heat might very possibly develop the energies of natural metallic combinations, he made experiments with single pieces of metal, and found that some of them became highly electro-magnetic by the process.

He found that if a piece of iron be immersed in distilled water, its polar particles and those of the metal being brought to the sphere of each other's influence, begin to operate on each other; and the recuperative polar forces mutually assisting each other are enabled to separate the constituent particles of the aqueous compounds—the oxygen being carried to the positive poles according to the well-known laws of electro-chemical action.

By this means, a constant change of the electric currents will take place between the polar points on the surface of the metal, and the currents to which they are presented; and multitudes of electric currents are thus produced, which flow through the metallic and fluid media in exact directions, as in the voltaic pair. These directions are as varied as the variety of the positions of the elementary poles in their general distribution over the surface of the metal. The positions of the polar points on the surface of the metal frequently change during the dissolution for various reasons, which depend on the deposition of oxide formed by the electric currents and many other causes.

The decomposition of distilled water is slow by the natural polar energies on the surface of a piece of iron; but if the water is mixed with sulphuric acid, the polar energies become considerably more active, and the decomposition of the liquid, and the disappearance of the iron more rapid—the surface of the iron soon becoming exceedingly rough. It will thus be seen how iron smooth before the action takes place, soon becomes rough; for the oxygen, being the only part of the water which unites with the metal, becomes unequally distributed over the surface at its positive poles only. The negative poles, having nothing to combine with, are left; and they remain for a time as prominent as at first, But as the process advances, the changes of the positions of the metallic poles which are continually going on, being attended by corresponding changes in their electric conditions, those parts in the surface which had previously been electro-negative, will occasionally become electro-positive, and consequently will become blended with oxygen liberated from the aqueous particles to which they are immediately presented, and in this manner, every part of the surface becomes eventually oxidized.

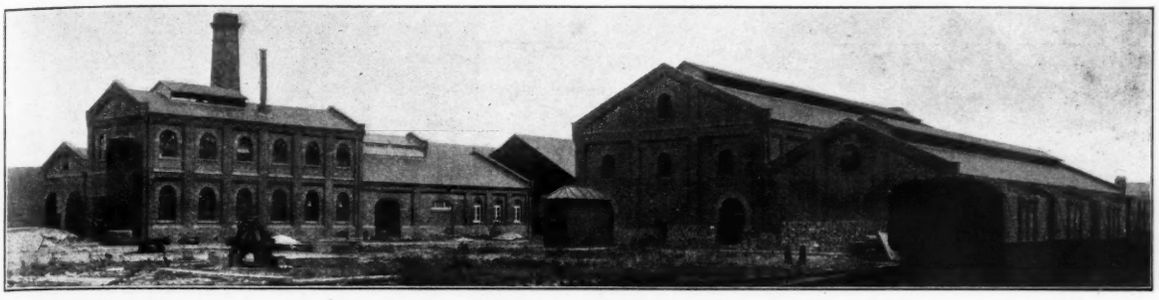
As provision is made in the base of the stove for the water to collect, so that there may always be a supply there, this will account for the difference in time between the first discharge of the liquid and the discharges which takes place afterwards. As evaporation evolves electricity, and provision is made for the moisture or vapour to rise in the stove without escaping, as the iron is heated and part of the iron is magnetized as described, and as water and sulphuric acid are produced from the combustion of the coal gas, there are all the elements necessary for the production of natural galvanic action.

Considering that the particular stove experimented with by Dr. Rideal was not made as a scientific instrument for laboratory use, the results obtained by him may be considered to prove the satisfactory manner in which it worked.

---

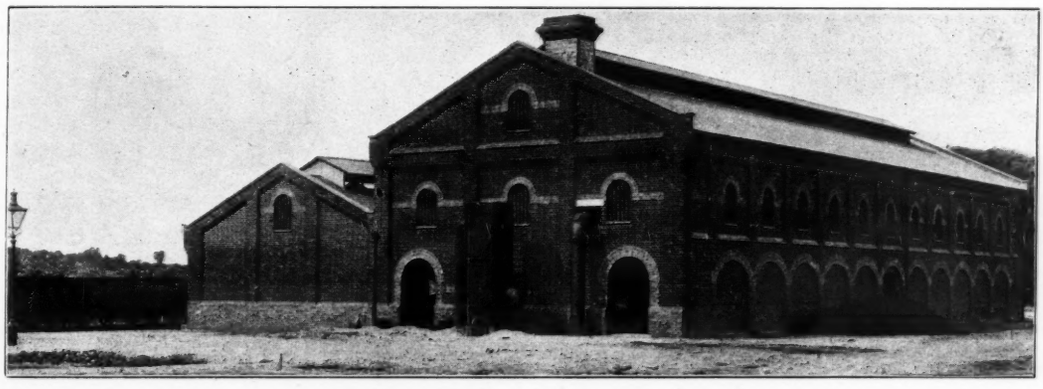
The name of Mr. George Ennis, who is well known in gas circles, has been placed by the Lord Chancellor on the Commission of Peace for the County of London.

# THE NEW WINNALL GAS-WORKS FOR WINCHESTER.



General View of the Works from the Railway.

The considerable prosperity that has attended the gas industry during the past quarter-of-a-century has had no limitation, and there are no signs of it having any, in regard to place or people. Not only has there been remarkable progress in the gas business in the great industrial and thickly populated cities and towns, but in all (down to the smallest) residential cities and towns a gratifying measure of progress has been the unexceptional rule. Even in the sedate cathedral city of Winchester—the capital of Saxon times, and wealthy in its historical associations—the business of gas supply is now making such headway that, with all the perseverance of the Company's Engineer and General Manager (Mr. H. C. Head) and his willing staff and men, the old works in Staple Garden are no longer able to supply the increasing quantity of gas required by the consumers. In 1902 the Directors foresaw that the existing works would probably prove inadequate in the near future, and consulted Messrs. Corbet Woodall and Son. Acting on their advice, fresh parliamentary powers were sought; and in 1903 an Act of Parliament authorizing the raising of the additional capital required for extending the Company's business and for moving the gas-works from the old cramped site in the centre of the city to more convenient and larger site, was obtained. The advisibility of this step has already been proved, as with the appointment of a new General Manager last year, the business of the Company which had not increased since 1902 has gone ahead rapidly; and it was only with the greatest difficulty that the gas



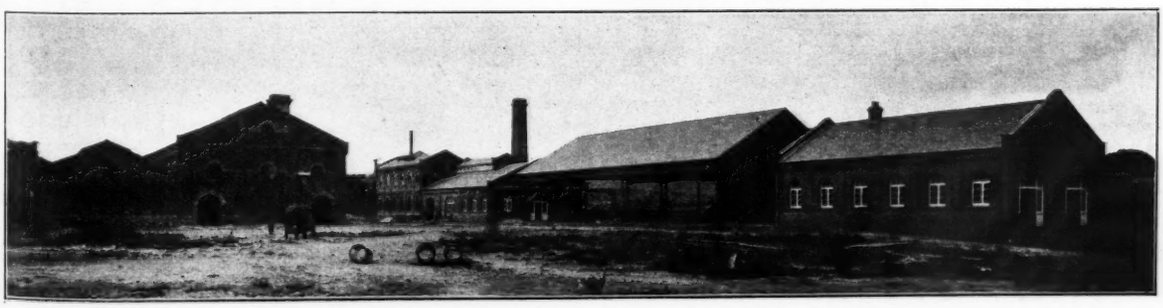
The Retort-House and Coal Store—South End.

required last winter was manufactured at Staple Garden, and, with the increased consumption obtained this year, it would have proved absolutely impossible next winter.

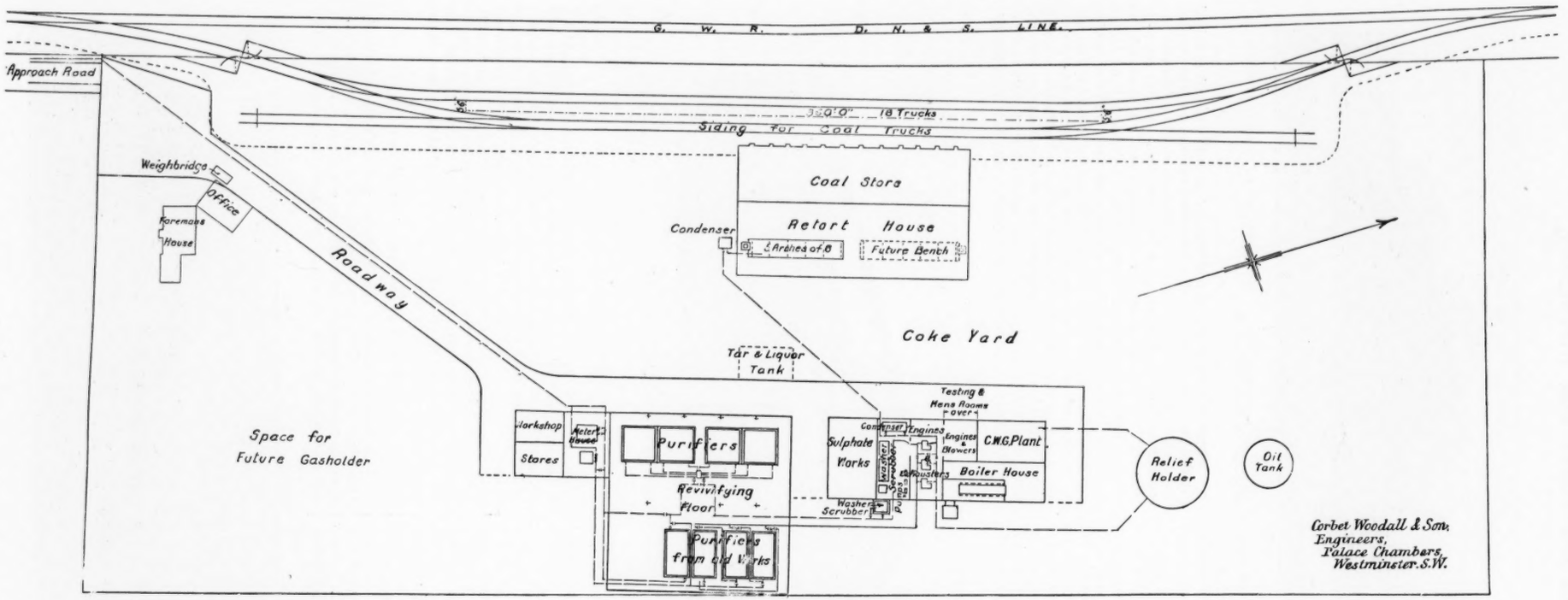
Confined on all sides, and all available working space having been taken up, the works could only be prevailed upon by gentle pressure to make about 300,000 cubic feet of coal gas a day; and this was supplemented by carburetted water-gas plant of Messrs. Humphreys and Glasgow's type, capable of producing 225,000 cubic feet. The increase in consumption last half year—during which period 142 additional hired cookers and 202 prepayment installations were made in the Company's district—was 9 per cent. The maximum day's consumption last winter was 451,100 cubic feet; and the gasholder capacity is 350,000 cubic feet—in three holders, one of which is situated at Water Lane, and the other two near the South-Western Railway Station. These figures are sufficient to show that the necessity for new works had become urgent; but if further testimony were demanded, it would be found in a speech by Mr. Corbet Woodall (which will be found reported in a subsequent column), in which he narrated the purport of a conversation he had had with the man in charge of the Staple Garden works. Mr. Woodall's informant stated that it had been necessary of late to get the gasholders well filled by the morning, because, between morning and lighting time, it had been impossible to make any gain in the stock—that is to say, added Mr. Woodall, the uses of gas are so diversified that, even in the daytime, all the gas made is used as it is produced.

### The Site of the New Works.

With such progress in the business, and with the old works strained to their fullest extent, the Directors were compelled very early to exercise the parliamentary powers obtained by the Company some two years since, and acquire a site for new works. The



The Works from the South—The Station Meter and Governor House in the Foreground.




GROUND PLAN OF THE NEW WINNALL GAS-WORKS OF THE WINCHESTER WATER AND GAS COMPANY.

prudence of the step taken then has been confirmed by the recent unswerving progress of the business. The Directors were advised in the matter of the purchase of a site by Messrs. Corbet Woodall and Son; and it may be at once stated that the works which resulted, and which it is our pleasure to describe to-day, were designed by, and their construction was completely carried out under the direction and supervision of, that firm. The site of the new works is at Winnall; and it is favourably situated for economical working—being in this respect the antithesis of the old one nestling in the very midst of Winchester, and far removed from railway or any other but road communication. The new site was purchased from the Ecclesiastical Commissioners, has an area of about 5 acres, adjoins (and has sidings connecting with) the lines of the Great Western Company, has also a private road connecting it with the highway, is about 1 mile from Winchester Cheesehill Station, and about ½ mile outside the borough boundary on the north-east side. This is sufficient to show how desirable a gas-works site both for the people of Winchester and the Gas Company it is; for to both as the old works are closed down through their span of useful life expiring, and the new ones are developed, the economy that must result from the working will be to the common benefit.

## DESCRIPTION OF THE WINNALL WORKS.

### RETORT-HOUSE AND COAL-STORES.

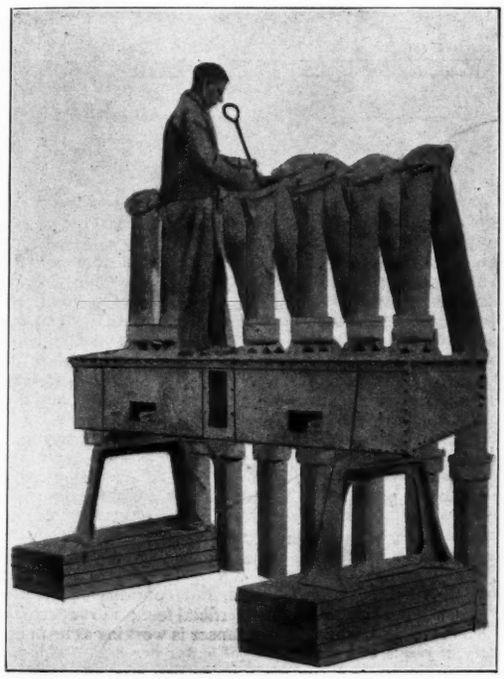
On the new site to which we have been referring, there have been constructed complete new works (excepting gasholders); and they have been designed by Messrs. Corbet Woodall and Son so that, at the minimum of expense, they are capable of being readily duplicated. In addition to this, the buildings have been so located on the site that extensions, beyond the duplication, can be made, by following the scheme of arrangement, in such a manner that the time is far distant when the operations of the works will be in any way hampered for want of working space. It will be observed from the drawings and photographs that the coal-stores and the retort-house are arranged alongside the sidings, and that there is abundant room for the erection in line of similar buildings, or for the retort-house being duplicated parallel by pulling out the fillings in the arched fronts of the building. Between the retort-house and the range of buildings on the opposite side of the site, there is extensive ground for coke storage and traffic throughout the works. Before proceeding with the construction of the buildings, a good deal of levelling had to be undertaken; and the spoil from the private road was used in the making-up of the railway sidings and in the general work of levelling.

A sentence or two will suffice for the sidings. These the Consulting Engineers had constructed direct without the intervention of contractors; the rails only being laid by the Great Western Railway Company. There are double lines of metals; and they are capable of accommodating eighteen to twenty trucks at one time. As observed from the illustrations, the sidings run alongside the coal-store for their full length; and the coal is deposited in store direct through several bays the length of the building, and is then dealt with by hand labour. Perhaps it should be mentioned here that, in the design, consideration has been paid to the possible application in the future, as the works are extended, of mechanical means for the transport and the handling of the materials.

The whole of the buildings on the works have a pleasing agree-

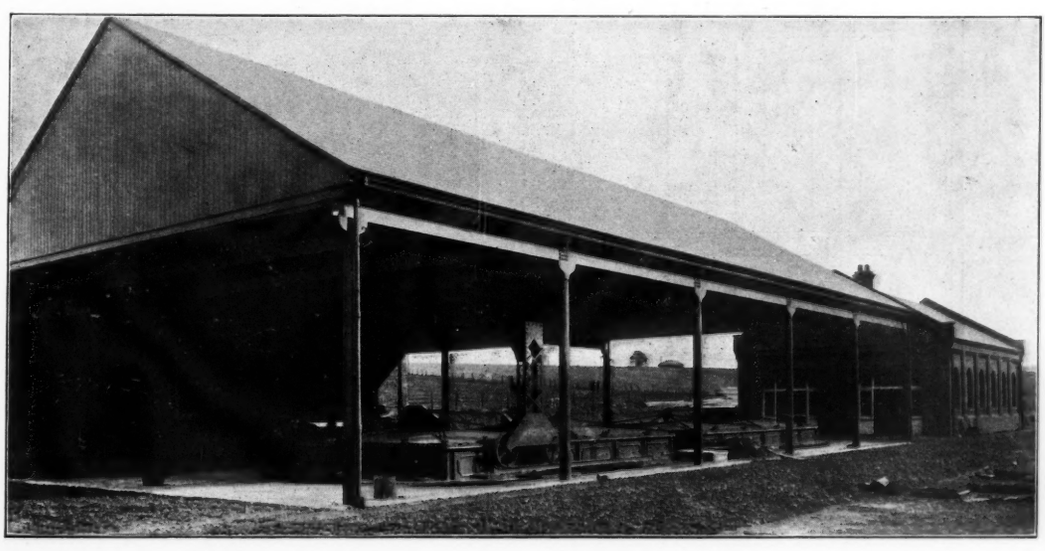
THE WORKS AS SEEN FROM THE NORTH—THE RELIEF HOLDER FOR THE WATER-GAS PLANT IN THE FOREGROUND.

ment in architectural features. The walls are of red brick, with plinths, buttresses, piers, door arches, and window arches and cells of blue Staffordshire brick; and they stand as testimony to the fact that buildings of attractive exterior need not necessarily be expensive structures. Messrs. H. Stevens and Co., of Southampton, were the builders; and so far as a brief inspection enables one to judge, right well have they carried out the designs and specifications of the Engineers. The retort-house is about 124 ft. 9 in. long by 38 ft. wide internally; and the coal-store is of the same length by 30 ft. wide. (The latter has a capacity of 1000 tons, but by high filling 1500 tons can be stored.) The roofs are each formed of 17 mild steel trusses, 38 feet span in the retort-house and 30 feet span in the coal-stores, with slate covering. The ventilators are 112 feet long and 8 feet wide, with side openings about 2 ft. 6 in. high. The basement of the retort-house has a concrete floor, and is about 8 feet high to the stage-floor at the ground level. In the basement, there is abundant working room. In front of the furnaces, there is a space about 16 feet wide; and a passage runs along the rear of the settings.

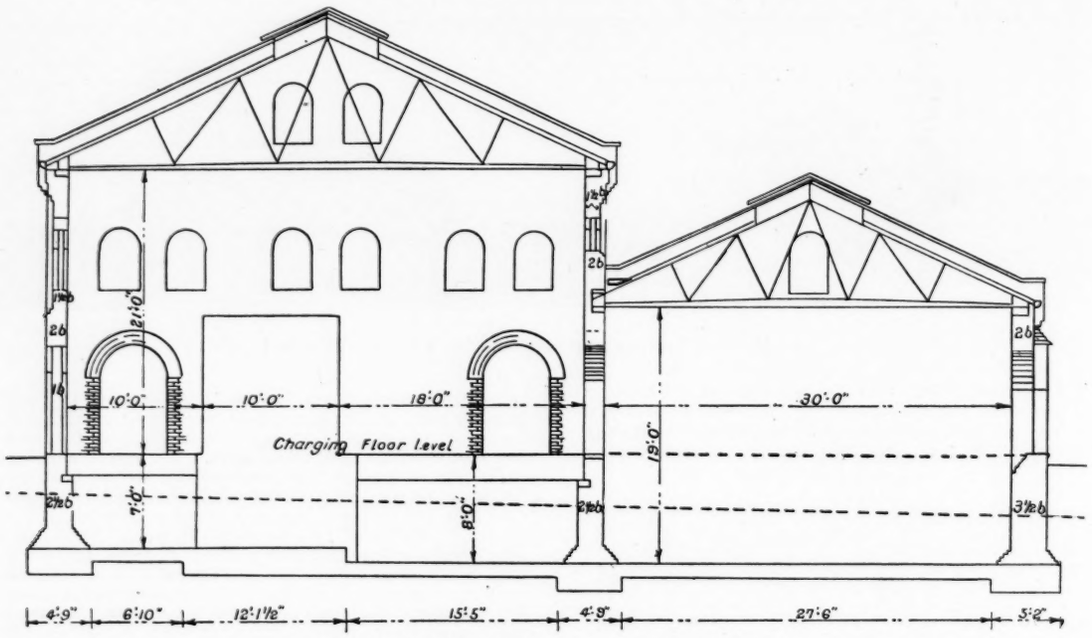


THE "BOURNEMOUTH" ARCH-PIPE.
(The Hydraulic Main at Winchester is of U Section.)

Perhaps it will be advisable to dispose of the structural details before touching the retort-bench. The stage-floor, it is noticed, has been built of iron joists, with concrete floor, paved with York flagging. In front of the bench, there is a fine clear working space, some 18 feet wide; while at the rear, the stage is 10 feet wide. The bench itself being only 10 ft. 6 in. wide, there is, it will be remarked, abundant room for the application, when desired, of stoking machinery of any form, and (as will be seen presently) even the pusher type of machine can, through the provision made in connection with the retorts, be adopted if in the future it should be deemed fit. Situated centrally on the charging-floor by the division wall between the house and the coal-store is a hydraulic lift, by the Hydraulic Engineering Company, Limited, of Chester, for the raising of supplies from the basement level. Combined with the lift-well are the steps giving access to the basement. It may incidentally be mentioned that the size of the lift platform is 5 ft. 4 in. by 4 ft. 8 in.; that the hydraulic working pressure is 150 lbs. per square inch; and that the lift is capable of raising loads of 10 cwt. The lift is provided with three wrought-iron gates, one at the top and two at the bottom level; all being arranged to work automatically by the rise and fall of the platform. Round three sides of the lift enclosure at the top, and two sides at the bottom level, are wrought-iron fences. For operating this lift, there is a horizontal duplex steam-pump of the boiler-feed type, capable, with a steam pressure of 60 lbs. per square inch, of delivering 20 gallons of water per minute against a pressure of 150 lbs. per square inch. The pump has two steam-cylinders $7\frac{1}{2}$ inches diameter, two pump cylinders $3\frac{1}{2}$ inches diameter by 6-inch stroke, and has the ordinary special duplex cross-over valve motion.



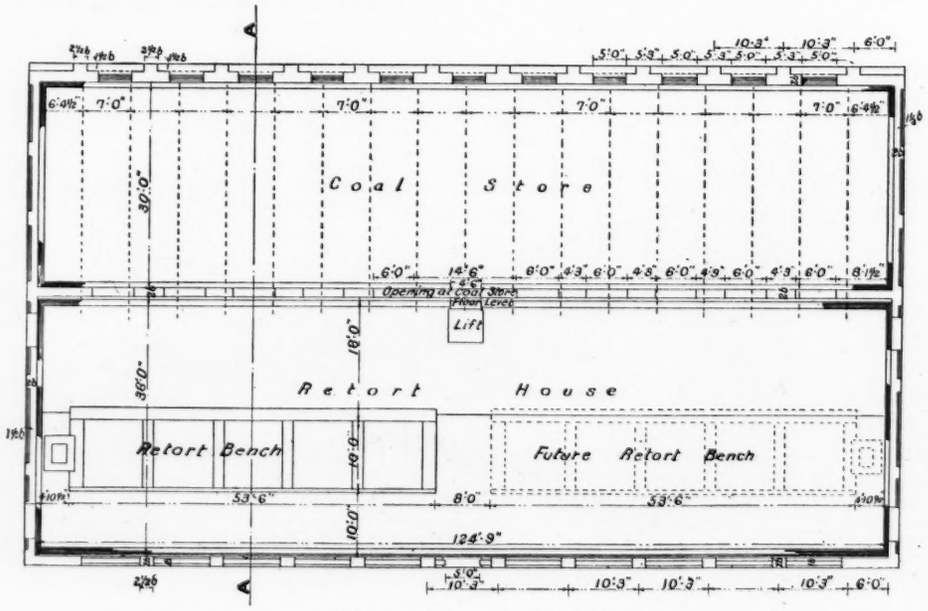
THE PURIFIERS AND OXIDE REVIVIFYING FLOOR.



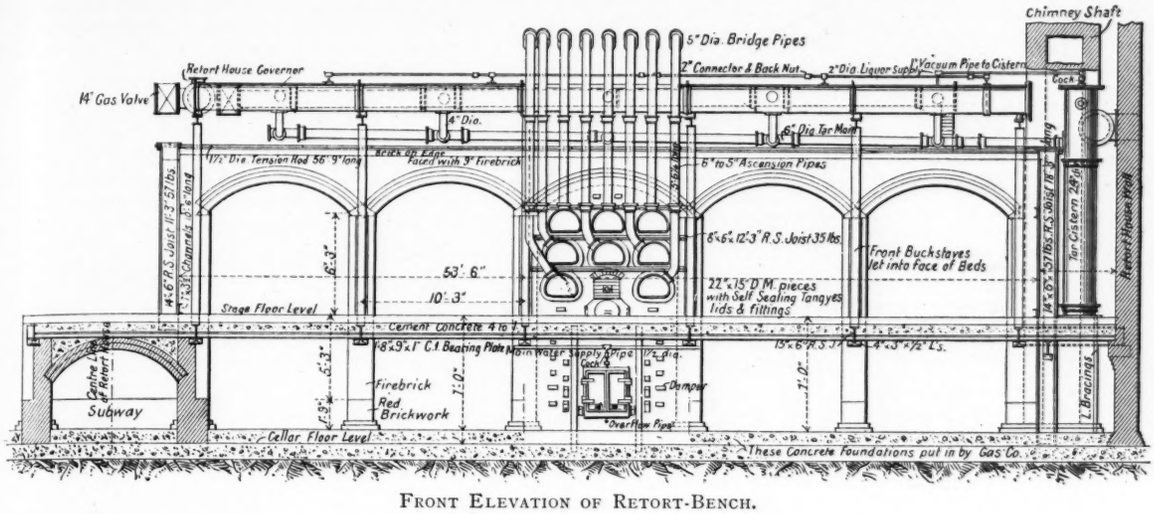

SECTION OF RETORT-HOUSE AND COAL-STORES.

Having given these structural details, we are left free to deal with the retort-bench. The house is built for ten settings of eight 10 ft. 6 in. retorts. Only half this number of beds has for the present been constructed; but the concrete foundation for the whole bench has been laid—being 122 ft. 3 in. long by 12 ft. 1½ in. wide, and 2 feet thick. Messrs. Gibbons Bros., of Dudley, secured the contract for the bench, chimney-shaft and ironwork, stage-floors, and fittings. The total length of the bench is 53 ft. 6 in.; and its height is about 17 ft. 3 in., measured from the top of the concrete foundation. The width of the bench above the floor-level is 10 ft. 6 in., and below 12 feet. The arches are each 8 ft. 9 in. wide in the clear, with fire-brick division walls 1 ft. 6 in. thick, and end abutments 1 ft. 10½ in. thick. The details of the brickwork need not be given, as the principal ones are shown on the drawings; but the internal dimensions of the chimney-shaft, it may be stated, are 2 ft. 3 in. by 3 ft.—the height being 40 feet from the surface of the concrete. The furnaces are of the regenerative type; and the retorts are of Ω shape, with rounded corners, 22 in. by 15 in., by 10 ft. 6 in. For convenience in scurfing, and with an eye to discharging by some pusher type of machine being eventually adopted, the retorts have also mouthpieces at the rear side of the bench. The buckstays, tie rods, &c., are all of substantial size and weight. As to the retort-bench fittings, the mouthpieces are of the Tangye make. The ascension-pipes are tapered, 6 in. to 5 in.; and the arch-pipes are of the Bournemouth pattern (Messrs. Woodall, Head, and Green's patent—see p. 619)—bending over inwards, and then dropping down straight into the dip-pipe—the junction at the top of the ascension being fitted with a cap for inspection. The dip-pipes are of 5 inches internal diameter. The hydraulic main is of U shape, 1 ft. 8 in. wide by 1 ft. 8 in. deep, and is separated into five sections by division-plates. The collecting-main is of cast iron, 14 inches diameter; while the tar-main is formed of 6-inch cast-iron spigot and socket pipes, with 4-inch branches to the tar-valves. Between each valve and the hydraulic main is a 4-inch bend, provided with a removable cleaning-cap. These bends are of various lengths, and arranged for a fall of 1 inch per setting on the 6-inch main. A tar-cistern, 24 inches internal diameter, is situated at the end of the bench for the reception of the tar and liquor from the hydraulic main; and by means of the weir-valve on its overflow, the seals of the dip-pipes are regulated. A wrought-iron liquor cistern, of 400 gallons capacity, has also been provided. The foul-main running alongside the house is constructed of steel plates, and is 18 inches in diameter. Outside, at the south end of the retort-house, as seen in one photograph, is a rectangular vertical tube condenser of 300,000 cubic feet capacity per twenty-four hours. It was supplied by Messrs. R. & J. Dempster, Limited, and contains 64 steel tubes. It gives a water surface of 520 superficial feet; 140 superficial feet of air surface; and, when the condenser is working at its maximum capacity, it requires 2250 gallons of water per day. The connections are 16-inch. All the work described has an excellent and well-finished appearance.

This is a suitable position to mention that an elevated water




PLAN OF RETORT-HOUSE AND COAL-STORES.



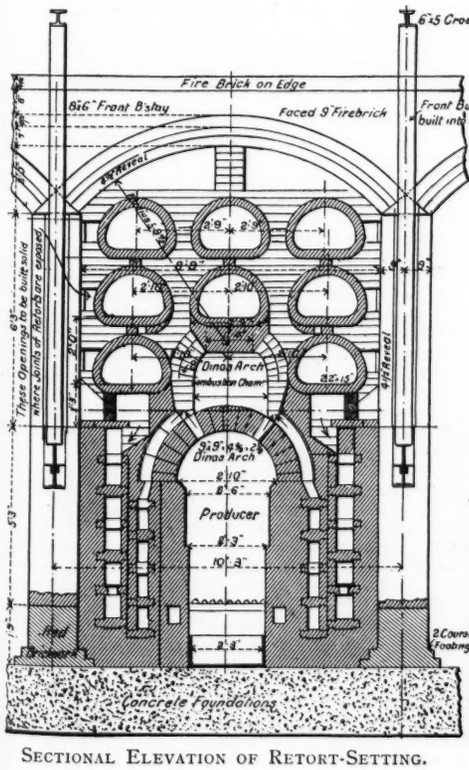

FRONT ELEVATION OF RETORT-BENCH.

and liquor tank—divided into two, and of a total length of 20 feet, width of 10 feet, and depth of 5 feet—has been constructed by Messrs. Newton, Chambers, and Co., Limited.

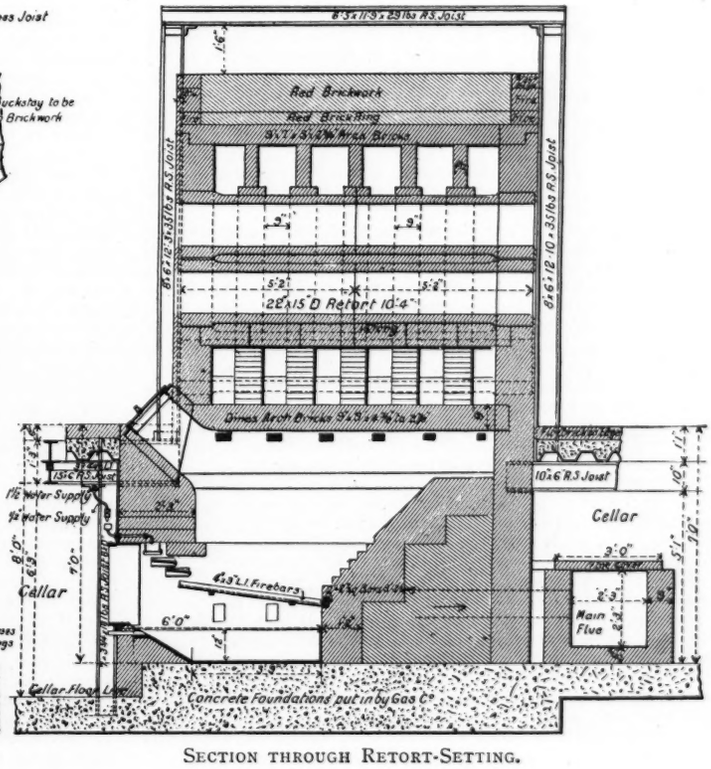
### CARBURETTED WATER-GAS AND MACHINERY HOUSE, PURIFIER-SHED, AND STATION-METER HOUSE.

Regarding the range of buildings on the opposite side of the site. The largest block is that devoted to the carburetted water-gas plant, machinery room, boiler-house, exhauster-house, sulphate plant, &c. It is, over all, 120 ft. 9 in. long by 44 ft. 7½ in. wide, and is built practically in the same style as the retort-house. The carburetted water-gas house is 36 ft. by 17 ft. 7½ in.; the machinery room 16 ft. 10 in. by 19 ft. 7½ in.; the boiler-house, 54 ft. by 20 ft. 6 in.; the exhauster-room, 41 ft. 7½ in. by 17 ft. 6 in.; and the sulphate-house, 41 ft. 7½ in. by 25 ft. Over the scrubber-washer house and exhauster-room there are glass lantern lights; and the sulphate-house has a roof of two wooden principals. With these exceptions, the roof is built of iron principals and slated, as in the case of the retort-house. In the exhauster, machinery, and apparatus rooms is a dado of brown glazed bricks; and it is obvious, when these rooms are finished, there will be a pleasing smartness about them which will encourage the men to keep the machines in bright and clean condition. The chimney shaft to the boiler-house is 64 feet in height, with internal dimensions varying from 4 ft. 6 in. square at the bottom to 3 ft. 6 in. at the top.

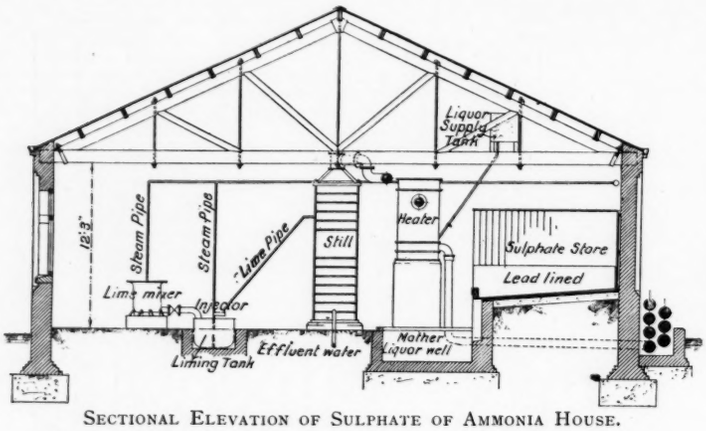
The carburetted water-gas apparatus first claims attention. It is the plant removed from the old works by Messrs. Humphreys and Glasgow, and improved and extended so as to increase the productive capacity from 225,000 to 350,000 cubic feet per day. The apparatus has been rearranged so that the direction of gas making may be reversed in the generator; and a new steel tar-separator, a new blast main from the two blowers, and safety interlocking valve gear have also been fitted. A new generator, 6 ft. 4 in. by 13 ft. 3 in., a new pair of blowers, generator blast-valve, stack-valve, &c., have also been supplied; making an up-to-date plant, with the higher producing capacity mentioned, and prepared for further extension as required. Connected with the carburetted water-gas plant, in the machinery room there are two vertical engines of Messrs. Marshall's make; and a little removed from the building, the relief holder, originally constructed by Messrs. Cockey and Sons, of Frome, is being re-erected. In the boiler-room is found a Lancashire boiler, by Messrs. T. Beeley and Son, 26 ft. long by 6 ft. 6 in. in diameter, with a working pressure of 100 lbs. per square inch. The boiler is fitted with Wilton's patent forced-draught furnace; and the feed-pump is capable of supplying the boiler with 600 gallons of water per hour against the steam working pressure. Passing next to the exhauster-room, we find already erected one of Messrs. George Waller and Co.'s patent three-blade rotary exhausters, capable of passing 25,000 cubic feet per hour, for the coal-gas plant; and one of similar capacity is being put down for the carburetted water-gas plant. The same firm also supplied a battery of plunger pumps, and Dudbridge gas-engine, with countershafting



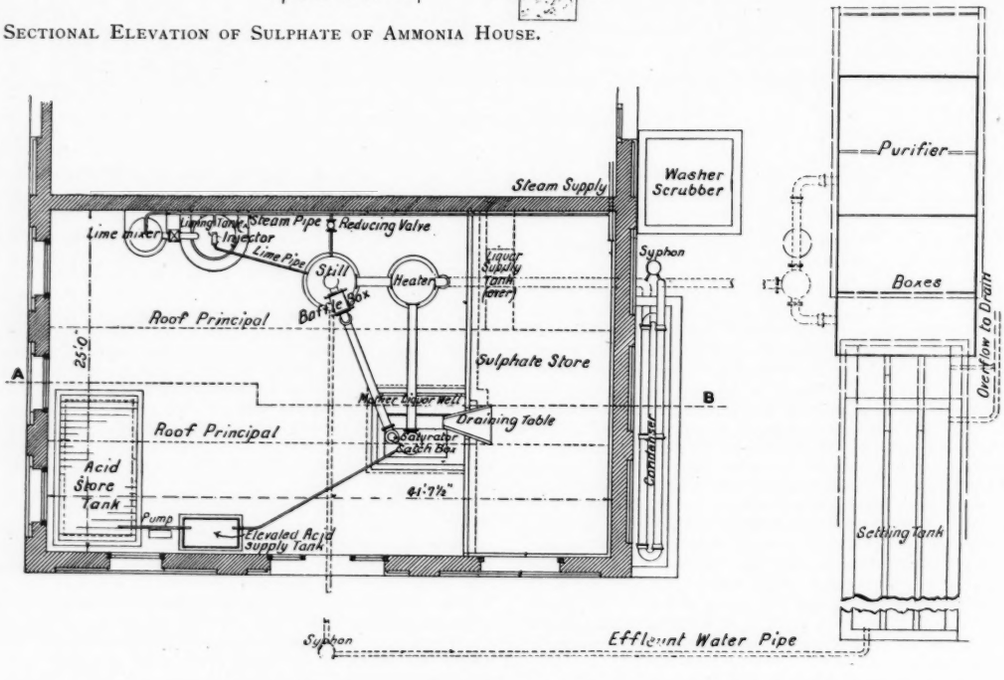

SECTIONAL ELEVATION OF RETORT-SETTING.




SECTION THROUGH RETORT-SETTING.




SECTIONAL ELEVATION OF SULPHATE OF AMMONIA HOUSE.




GENERAL ARRANGEMENT OF SULPHATE OF AMMONIA PLANT.

to drive both exhausters and a rotary washer-scrubber, erected (with a steam-engine) by Messrs. W. C. Holmes and Co., in the adjoining room. This washer-scrubber is capable of passing 600,000 cubic feet in twenty-four hours. Close by the scrubber is a Livesey tar-extractor, also of a capacity of 600,000 cubic feet, and supplied by Messrs. R. & J. Dempster. Turning to the sulphate-house, it is found to contain a plant erected by the Chemical Engineering Company, and is of a size equal to dealing with 20 tons of liquor per day. Its general arrangement will be seen from the drawing.

In the range of buildings, the purifier-shed, with its double span roof, attracts the eye. The shed is some 102 feet long by 100 feet in breadth. It has a wall only at the back; and from this are carried eleven immense wooden roof principals, which are supported in the centre of the shed and at the front by two rows of six cast-iron columns. The roof is slated, and has wooden wind-screens at both ends. The shed at present contains four purifiers, 15 feet square and 5 ft. 6 in. deep; and they were supplied by Messrs. Samuel Cutler and Sons. They are fitted on the Jäger patent system, and have a purifying capacity fully equal to 700,000 cubic feet. Only about half the area of the shed is at present occupied by the purifiers and revivification requirements, so that there is plenty of room for extensions.

In the next block, and under one roof, we have the meter-house, stores, and workshop. The meter-house is some 32 ft. by 25 ft.; and the stores and workshop are each 25 ft. by 15 ft. 7½ in. The building has a gable roof, and in all respects harmonizes in style with the buildings already described. The meter-house has a dado of glazed bricks; and when completed, it will have quite an attractive interior. The meter is of the Parkinson and Cowan type, with all their modern improvements. It was supplied by the Westminster branch of the firm, and is constructed to pass 25,000 cubic feet an hour at 100 revolutions.

We have omitted to mention that provision has been made for a mess-room for the men, and a photometer-room; and at the entrance to the works is the foreman's cottage and works' office. The Company's head office will, of course, continue in the centre of the city.

From the new works, a 14-inch main has been laid to the gasholders, near the London and South-Western Railway Station, with a 12-inch branch to the Water Lane gasholder.

### Opening of the New Works.

From the foregoing description, it will have been gathered that the works, for the size, are most complete; and that, at a comparatively small cost, their output can be largely extended. The productive capacity for coal gas is 250,000 cubic feet, and for carburetted water gas 350,000 cubic feet. The old works, too, will be continued until they are sufficiently exhausted to justify their dismantling. Under such circumstances as these, the Chairman and Directors and proprietors, together with the people of Winchester, are to be congratulated upon the excellent provision that has been made for assuring an abundant supply of gas, which, as time progresses and the new works develop—other contributory influences not adversely affecting the position—will lead to lower prices for the consumers than at the present time.

Last Tuesday there was a great deal of congratulation flowing at Winnall, when, on the invitation of the Chairman (Mr. J. Charles Warner) and his colleagues, the Mayor (Mr. F. Seymour Morgan) and members of the Corporation, a number of the shareholders, neighbouring gas engineers, and friends, visited the new works and celebrated the opening by a luncheon. In addition to the Chairman, there were, among those present, his colleagues, Mr. W. T. Warren (Vice-Chairman), Mr. H. Johnson, and Mr. A. W. Oke; the Mayor; the Chairman of the Winchester Electric Light Company (Mr. T. F. Kirby); Mr. Corbet Woodall, representing the Consulting Engineers for the works; Mr. H. C. Head, the Company's Engineer and General Manager, with his Assistant, Mr. P. Drewett, and the Secretary, Mr. C. Wooldridge. The visitors included the following Engineers: Mr. J. D. Ashworth, Mr. A. R. Burch, Mr. S. W. Durkin, Mr. F. Durkin, and Mr. Norton H. Humphrys. There had been a meeting of the shareholders in the morning; and about one o'clock, a special train left the Great Western station for Winnall. Only a few minutes were required to transport the visitors to the sidings of the new works, where they dismounted. The works were gay with flags and pennons; and they at any rate did something to relieve the sombre atmospherical conditions that ruled not only in Winchester that day but in most other places. Both before and after luncheon, the visitors made a careful survey of the buildings and plant; and were, through the attention bestowed on them by Mr. Warner, Mr. Woodall, Mr. Head, Mr. Drewett, and Mr. H. D. Cable (the Clerk of Works to the Consulting Engineers), vastly interested in all they saw—more especially the retort charging and drawing operations.

The unoccupied part of the purifier-house was, by a little "engineering" on the part of the caterers, converted for the occasion into quite a comfortable luncheon room; and it was here that, about two o'clock, the Chairman and Directors and their

guests assembled. Lunch ended, there were a few toasts—the first, of course, being the usual loyal one. Then followed—

Mr. S. TANNER, the Chairman of the Winchester Rural District Council, who proposed the "Winchester Water and Gas Company." He remarked (amid laughter) that one thing which pleased him very much was that the Company had come out into the rural district away from the expensive rates of the city. In the country, they had low rates. As he was the Chairman of the Assessment Committee, he should bear this in mind when the Company came before him in connection with these new works. The Company he noticed were also extending their borders into the rural districts. One main was being carried to Twyford; and it would help the people there very much—also the rates. However, very heartily he proposed the health of the Chairman and Directors of the Company, and expressed the opinion that the Company would continue to prosper as hitherto.

Mr. WARNER, in replying to the toast (which was cordially and genially received), said it was a great honour to be allowed to respond for the largest trading Company in the city of Winchester and neighbourhood, especially a Company concerned in the supply of water, which was an absolute essential to the well-being of the city, and which water was, he was glad to feel, the best that could reasonably be expected. It gave him pleasure to welcome there that day the Mayor and many of his colleagues, as well as many of the representatives of the Gas Company and the Electric Light Company. The Companies were in competition. Competition, however, was perhaps good for them all; but the one who had the best of the job was the better pleased. He might just state briefly the history of the Company's move to Winnall. The concern was established in 1865; and it carried on a fairly prosperous business. In 1884, having grown larger and entering into still greater prosperity, an application was made to Parliament for extra powers and money. From that year until 1903, they were content to prosecute their business and manufacture in the middle of the city; but, fortunately he thought, and he hoped wisely, the Directors came to the conclusion that it was necessary, in order to supply gas to the increasing population not only of Winchester but of districts bordering on the city, to augment their means of manufacture, and, not of less importance, that they should move their works. The Directors did not think that the middle of Jewry Street was the best place for the works; and so they felt that, in taking them away from there, they would have the cordial support of the Mayor and Corporation. He was glad to say they came to a friendly understanding with the Corporation. They raised no objection on their own part, and no objection to things the Company wanted. The result was that those present had met together that day to see the Company's new works. He only hoped that the works would be fully occupied in making gas; that incandescent lighting would still continue in the streets of Winchester; and that Shawford and Twyford would be following the example set them by the old city. He felt certain himself there would be an increased trade for the Company—more especially as it was the common feeling now that every one required a better light than in the old days. He was sure there would be in the future a demand for gas far exceeding what they had to meet at the present time; and those who were interested as shareholders in the Company need not feel any anxiety with regard to its prosperity. Of course, in building these large works, they had to take advice from those best able to give it to them; and it was their good fortune to be introduced to one of the leading gas engineers in England—Mr. Corbet Woodall. He was a Director of the Gaslight and Coke Company, and of the Imperial Continental Gas Association, and had, he (the Chairman) believed, superintended or built gas-works nearly all over the world. He knew he had been out to Japan, and seemed to be every day in Germany. (Laughter.) However, by his able assistance, the works before them had arisen. He (the Chairman) was not competent to explain as carefully as he could wish the exact functions of the plant. He knew that the coal came in (as it were) at the back door, and that gas passed away through the meter. He wished to interpolate a toast here—that of "The Health of Mr. Corbet Woodall;" and, in drinking to it, he would ask those present to thank Mr. Woodall's firm for having given them these magnificent works.

Mr. CORBET WOODALL, in response, said it was exceedingly kind of Mr. Warner—might he not say characteristic of him?—to have introduced this toast, and to have given him (the speaker) an opportunity of saying a few words with regard to the works on which they were assembled, and which they would inspect after lunch. Mr. Warner had been speaking ironically when he told them of his (Mr. Woodall's) personal engagements. He had occasionally to go abroad; but he did not spend every day out of England. (Laughter.) He had at any rate been able to give some time, in collaboration with his son and partner, to the design and construction of the Winchester Gas-Works. The Chairman had explained that these works had been built to replace works in the heart of the city. The plant at Staple Garden was originally designed when the demand for gas was a very small one; and it had been ingeniously adapted from year to year as the demand for gas increased. But the time had come when the carrying on of such business as the Company now conducted was absolutely dangerous upon such a site. In times gone by—and the bad custom was not dead yet—it was a general practice, on the part of Municipalities and of Parliament, to limit the amount of land which a gas company might use for the purpose of their works. He supposed gas making was regarded as a rather objectionable, smelly business; and the idea was that the smaller the area to which the works were restricted, the smaller would be the amount of nuisance created. Needless to say, the limiting of the area of the land created the nuisance it was desired to avoid. Here, at any rate, they had ample land for their purposes at present; and, in the days to come, when the demand exceeded the capacity of this place, there might yet be some land in the neighbourhood not covered by the extended city of Winchester. With regard to the works themselves, he thought his friend, Mr. Head (who had been most cordially helpful throughout the construction of the works), would be better able as they went round to explain in the presence of the apparatus what its particular duty was. He might say with regard to the industry that he repudiated altogether the idea of its being the crude and somewhat objectionable manufacture that some people considered it. One reason he had already given for the view that was sometimes taken; but he regarded gas manufacture as one of the most perfect from a scientific point of view with which he was acquainted. Having regard to the thoroughness with which the raw material was accounted for, he knew no industry superior to it. Mr. Warner had said the coal went in at the back door; and they saw by the record of the meter that the gas came out. But after the gas was made, there remained other products and substances, the result of the distillation of the coal, which were the bases of a large number of industries that would suffer greatly were the manufacture of gas seriously diminished. One found these products used in the fertilizing of land, in the beautifying of fabrics, in the reduction of gold at the mines, in sanitary work in our hospitals and homes, in making ice in hot weather and fires in the cold, and in fifty different ways they were of the greatest value. In the old days, the neighbourhood of gas-works was probably subjected to annoyance, because some of the most valuable products had to be allowed to run to waste. He heard a gentleman that morning saying that he hoped none of the liquid products he saw would find their way into the river. He (Mr. Woodall) could say that there was no fear of that, because there was nothing that came from gas manufacture that was not of value. Calling at the old gas-works in Staple Garden that morning, and speaking to the man in charge there, he was told that they had now to get the gasholders well filled by the morning, because between morning and lighting time, they made no gain in their stock—that was to say, the uses of gas were so diversified that, even in the daytime, all the gas made was used as it was produced. He knew of towns now where the hour of greatest demand for gas was not Saturday night when all the shops were open and the lamps alight, but from twelve to one o'clock mid-day Sunday, when the working man's dinner was being cooked. He had no fear whatever with regard to the future of the gas industry, but thought he might say they welcomed the intrusion (he would say for the want of a better word) of the electric light in the field of lighting. It had had something to do with the great increase in the standard of light which gas companies had now to meet. There was room for both; but he agreed with the Chairman in the hope that the streets of Winchester would always be gas lighted, for in that field he (Mr. Woodall) felt strongly that gas was out and away the most beautiful and effective illuminant. The Chairman had referred to the obtaining of the Act of Parliament which authorized the building of these works; and he also referred to the fact that the Act was obtained without any parliamentary contest. He (Mr. Woodall) thought this was a matter of great importance to the Winchester Water and Gas Company; and it was only possible because of the relations existing between the Directors of the Company and the Mayor and Corporation of Winchester. It very often happened that because of perversity on the part of one side or the other, costly and unnecessary contests were entered upon, which permanently burdened the undertaking, and through it the citizens. In this case, consultation was held, some concessions were made on each side, and a Bill passed that was profitable to the Company, and altogether excellent for the town, at the minimum of cost. This was due largely to the conduct of the Mayor and Corporation. He had been asked, and it gave him great pleasure, to propose the prosperity of the City of Winchester and of its Mayor and Corporation. He believed that the Corporation of Winchester was a thoroughly representative body; and, speaking as a comparative stranger, he thought the condition of the city bore testimony to the care bestowed upon it by the Corporation. It was an unwise and deplorable impression that seemed to actuate some public bodies, that they were doing their duty when harassing the industries by which their city or town prospered. In Winchester, the Mayor and Corporation watched over the interests of the city. They got from the Gas Company all they could; but, at the same time, they did not consider that the prosperity of the Water and Gas Company was in any sense an injury to the city. It was not in places where the dividends of companies were low that gas or water was supplied at cheap rates, and the interests of the consumers well cared for. He had much pleasure in proposing the toast.

[Later Mr. Woodall acknowledged his sense of obligation to Messrs. H. Stevens and Co., the Contractors for the building of the works, for the admirable way in which they had carried out their contract; and also the assiduous attention of the Clerk of Works (Mr. H. D. Cable), who had represented his own firm during their construction.]

The MAYOR (Mr. F. Seymour Morgan) said it was with extreme pleasure that he rose to respond, seeing that the toast had been so aptly proposed, and so kindly received by everyone sitting round that festive board. As the Chairman and Mr. Woodall had told them, the Winchester Water and Gas Company worked most amicably with the Corporation; and, as a fairly old member, he could say the Corporation worked most amicably with the Water and Gas Company. The Corporation had complaints, and these complaints had to be dealt with by a Committee who had to see that the ratepayers were properly looked after. Of course, they were all human; and the slightest thing that occurred, they, of course, looked upon as a great nuisance. The ratepayers made complaints; and the authorities watered down those complaints, and in turn made complaint to the Company, who, he must say, met them in a very fair and just spirit. As to electric lighting, he remembered going through the Portsmouth Electric Light Works when the Corporation were considering whether they should take up the supply of electricity as a public authority. Mr. Warren (who was an Alderman at that time) welcomed the idea of an electric supply in Winchester. He welcomed competition, because he felt sure there was room enough for both gas and electricity. As years went by, this had proved true, because he saw, on looking through the balance-sheets of the Gas and the Electric Light Companies, that they were both prosperous. One result was that the amount paid for lighting was double what it was twelve years ago, simply because they were bound to march with the times. Winchester could not afford to sit down and say, "We have all we want, and we want nothing more." Therefore he was pleased to see that it had been proved there was room for both the lights.

"The Visitors" was the next toast; and it was proposed in suitable speech by Mr. W. T. WARREN; and he coupled with it the name of

Mr. T. F. KIRBY, the Chairman of the Electric Light Company. Mr. Kirby remarked that whatever their sentiments as guests might be, there was one sentiment upon which they were unanimous, and that was in wishing prosperity to the Winchester Water and Gas Company. He said this for the obvious reason that the prosperity of a company like a water or gas company or an electric light company was an index of the prosperity of the town which they served. The more prosperous a town, the more gas, the more water, and the more electricity was taken. There was every reason to believe that the prosperity of the Company who were their hosts that day would be continuous.

Mr. HEAD was called for; and he made appropriate reply. The toast of "The Chairman" was introduced by Mr. H. S. FRAMPTON; and the CHAIRMAN made acknowledgment—his last words being that, in the responsible position he occupied, it would be his endeavour to apportion fairly the interests of the shareholders of the Company and those of the citizens of Winchester.

Following the luncheon, as already stated, further inspection of the works was made; and about four o'clock the visitors left, with more congratulations to all concerned in the new works, and expressions of best wishes for the new chapter in the history of the Company being an unbroken record of the brightest success.

## COAL SAMPLING AND TESTING.

At the last Annual Meeting of the Western (U.S.A.) Gas Association, a paper on this subject was presented by Mr. W. B. CALKINS, of Fairmont (Va.), in the course of which he made the following remarks.

The common rule expressed in most chemical and metallurgical text-books in regard to sampling is that small quantities of the original mass shall be taken with such care that a representative sample is secured. But scarcely any information is given in regard to the number or amount of samples it is necessary to take in order to eliminate any possible chance of a slight error in one or more samples. This paper was not written with the idea of laying down any firm or fixed rule for sampling, but with the hope that those interested in establishing some general rule would take the matter up and determine for themselves the number of samples necessary to take, the amount to be taken, and the method of preparation in order to bring the error to within a fixed or assumed basis. If this can be done, and the co-operation of the Association secured, some common rule for sampling can be worked out, and a fixed basis established, upon which all future tests can be made.

The first few paragraphs of Professor N. W. Lord's "Notes on Metallurgical Analysis" express tersely why it is necessary to exercise such great care in obtaining small impartial samples which shall truly represent the original mass. He says:

> The object sought by the technical analysis is to ascertain the average composition of some particular lot of material—for example, a car-load of ore, an ingot of metal, or a bin of coal. The amount of material treated in the laboratory is of necessity limited to a few grammes. The preparation of this small portion so that its analysis shall correctly represent the composition of the mass from which it is taken constitutes the operation of sampling.

In sampling, as in any other kind of investigation, the person doing the work must know thoroughly what it is he wishes to learn, whether of the character or the quality of the coal, or of both. For character, no sample need be taken, simply a specimen of the particular seam is all that is necessary. It has been found that there exists a remarkable uniformity of coal over large areas. The character of the coal seems to depend more on geographical position and geological synclinals than on its place in the geological scale. In other words, it is generally the case that all coals in a particular locality, no matter to what geological seam they may belong, are of the same character. A notable exception to this, however, is in the Kanawha field, where the splint, gas, and cannel coals occur in close proximity. The character of a coal is indicative of its application in the industrial world. In the identification of a coal, the proximate analysis is more important than any other test. Accurate determination of the volatile matter is of the greatest importance, followed closely by moisture.

Ash is of value only as indicating the normal condition of the sample or specimen in hand; but it must never be overlooked, as a very high ash will affect the volatile matter to such an extent that the interpretation of the analysis will be very misleading. As an illustration of this point, let us examine the great beds of coal found in the Appalachian carboniferous series. Here we find the widest range or difference in character. On the eastern extremity of the bituminous field, one invariably finds coals low in moisture and volatile matter; going westward, the volatile matter, starting at about 12 per cent., increases regularly but gradually, with the moisture remaining constant, until a maximum of about 40 per cent. of volatile matter is reached. Evidently bituminous coals cannot contain more than this amount of combustible volatile matter. In order to become more volatile, which they do at about the Ohio River, the coal must take on more moisture. This actually occurs, so that from the Ohio westward the volatile matter remains practically constant, while the moisture increases regularly and gradually as we move westward, until the maximum is reached at the western boundary of the coal basin, where it carries 7 to 8 per cent. of moisture. The knowledge of these facts would indicate to the coal expert the probable location from which such specimens were taken.

In determining the quality of coal, the science and knowledge of sampling play a very important part; for the small laboratory sample given to the chemist must be taken and handled so carefully that it can truthfully be said to represent an average of the original mass. Knowing how difficult it is for two chemists, equally careful and skilful, and employing the same methods, to obtain check results in proximate coal analysis, even when each man is furnished with part of the same well-mixed finished sample, one can readily see how necessary it is that each man in collecting and preparing his own samples uses some method common to both, in number, amount, and mode of handling, so as to eliminate as much as possible the error of the sample.

Anyone who has attempted to sample a large mass of coal is acquainted with the difficulties met with in obtaining one that will truly represent the original body of coal. A large mass of coal is more or less a mechanical mixture of several compounds or minerals, varying in size and specific gravity. For instance, the slate and bone coal may be in very small pieces intimately mixed with the fine coal, or in flat, laminated layers running through the large lumps; or the pyrites may be present as large sulphur balls, or else in very small layers or streaks throughout the coal seam. So the taking of a sample which shall contain the same proportion of coal, slate, bone coal, and pyrites as does the original mass becomes a very hard matter; and the greater the amount of impurities the coal may contain, the greater the liability to error in the sample.

There are very few coals that have more than 5 or 6 per cent. of real ash in the normal coal; but admixtures of slate, bone coal, sulphur balls, and foreign substances from the roof or floor of the mine raise the impurities and complicate the sample. So a knowledge of the original form of the coal will greatly assist the analyst in deciding to what extent the sampling must be carried. It is necessary to determine not only the amount of impurities, but also the probable error of any single determination, which, in turn, will tell how many samples are necessary to establish an average that will be within the allowable error, either fixed or assumed. In sampling coal, no one method applicable to all cases can be carried out; but in sampling large exposed bodies of coal, we hold that one big sample which requires some time to crush down and quarter allows too many chances for error, and the quality of the coal in the original body must be judged by the one analysis alone.

Whereas, if several small impartial samples had been taken from the pile, crushed, and quartered down rapidly, which their small size would have permitted, and a separate analysis made on each one, the average of all the analyses would have represented more nearly the composition of the mass of coal than the analysis obtained from the single sample. This has been proved by a series of tests carried out under the direction of Mr. Frank Haas, chief of the Testing Department of the Fairmont Coal Company. For example, from a large pile 100 small samples of coal were carefully taken and analyzed. Using the percentage of sulphur for illustration, the average of the 100 sulphur determinations was assumed to represent exactly the composition of the coal pile. Now, if the analyses are taken in blocks of 10, starting with, first, the 10th and 20th, secondly the 11th and 21st, thirdly the 12th and 22nd, and so on, and the average of these blocks is taken, and in like manner blocks of 12, 15, 20, and 25, and the average obtained for each block of samples, a curve can be plotted which will show at a glance how many samples must be taken so as to reduce the error to the allowable limit. By this means we found that twenty samples must be taken in order to reduce the error to 0·10 per cent. or better. Of course, the "personal factor" of the analyst comes in; but, by reducing the error on the sample, we reduce the entire probable error.

If, after determining the number of samples it is necessary to take in order to limit the error, the time and expense necessary to analyze each sample are objectionable, a composite sample can be made by taking an equal part of each sample and thoroughly mixing. Using this sample for the laboratory analysis, results close to the general average can be obtained.

The test of a coal that can be made in the laboratory consists in the proximate analysis, the ultimate analysis, the determination of the percentage of sulphur and phosphorus, and the calorific value, either by calculation from the results of the ultimate analysis or by the use of some standard calorimeter. The laboratory test can also be made on the coking power of the coal, the effect of washing on coal, and the porosity of the coke. The proximate analysis is the most important test that can be applied in identifying the character of a coal or determining its quality. For the determination of sulphur, either Eschka's or the sodium peroxide combustion method is equally good. Where only a few coals are to be tested for sulphur, the sodium peroxide method is undoubtedly the most rapid, also the most expensive. For the ultimate analysis and other laboratory test, any standard book on quantitative chemical analysis will give the needful information.

---

Mr. MALCOLM LITTLE, Assoc.M.Inst.C.E., of Leeds, has just received an appointment under the Indian Government in the Public Works Department, and will leave the city shortly to take up his new position. Mr. Little is at present engaged as Resident Engineer in connection with the water-works at Kettlesing.

## NEW INVENTIONS AND PAST RECORDS OF THE GAS INDUSTRY.

Mr. Frederick Egner, whose name is well-known to many gas engineers in Great Britain, contributed recently to the "American Gaslight Journal" an article, in which he pointed out that he had on several occasions suggested to officials of some of the American Gas Associations the advisability of establishing what he would be inclined to designate "A Bureau of Archæology of the Gas Industry," pointing out at the same time the benefits which such an Institution would afford to the gas industry at large as saving the labour involved in the re-inventing of apparatus to carry out certain processes and possibly exploded ideas in reference to gas manufacture.

To emphasize the point he wished to make, Mr. Egner gave long extracts from a patent specification, issued on July 25 for an American invention, No. 795,790, granted to Carleton Ellis, of New York, for a "Process of Producing Gas." We need here only produce some portions of this specification.

"This invention relates to the art of making gas by the producer process, as distinguished from the retort and water-gas processes.

"It relates particularly to that branch of the art wherein the gas producer is functionally remote from the consuming apparatus, and may, therefore, be an entirely independent structure; although independence of structure is not absolutely necessary to the practice of my invention, and it is possible to combine the gas producer and consuming apparatus in a single structure, provided the organization be such as to preserve the essential functional characteristics.

"In the practice of this art, it has been necessary to employ a thick bed of incandescent coal, so that the carbon dioxide from the combustion in the lower layers may pass through the hot layers above, to be there reduced, as far as possible, to carbon monoxide—one of the atoms of oxygen of the carbon dioxide splitting off and joining with an atom of carbon of the coal, thus making two molecules of carbon monoxide from one of dioxide. This reduction is never complete. The combustible gas from a gas producer always contains carbon dioxide; and many efforts have been made to reduce the amount, in order to secure greater fuel efficiency. But these haphazard attempts up to the present time have been abortive, as certain principles connected with the law of mass-action have not been realized.

"I have discovered that the gases formed in or passing through a producer have a certain affinity or absorptive capacity for carbon dioxide, which prevents its complete reduction. I believe that the principle involved has been heretofore noted in connection with certain laboratory experiments in connection with the theoretical investigations of Rathke; but I believe I am the first to have discovered that this principle—heretofore apprehended theoretically—is of commercial importance in the practical art of making producer gas. So far as I am aware, all the makeshifts proposed have been founded on incorrect conceptions, not taking into account this principle; and for this reason, among others, they have not effected the end desired. By the application of the hereinafter described chemical theory, I have been enabled to solve the difficulty and to put the adjustment of the producer for highest efficiency upon an exact scientific basis."

After a further lengthy quotation from the Ellis specification, with its series of ten separate "claims," Mr. Egner proceeds: About 15 years ago the writer described, at the meeting of one of our Gas Associations, an experiment of his, consisting in driving off the carbonic acid from limestone by heating in a retort, then passing this gas through another retort filled with incandescent charcoal or coke, and afterwards through tar oils, thereby producing an illuminating gas. As limestone contains about 16,300 cubic feet of carbonic acid, which on passing through the second retort would be converted into carbonic oxide, leaving good lime as a result in the first retort, and a combustible gas after emerging from the second retort, the experiment looked to be inviting further investigation. The presiding officer at the time of the meeting mentioned was Mr. Emerson M'Millin, who stated at the time that he too, some years before, had worked on the same problem, and had gone so far as to propose lighting an Ohio town by the gas thus produced, but (the reason was not given) it never came to anything.

On July 18, the week before the issue of the patent just mentioned, we find that a patent (No. 795,208) was granted to B. E. Eldred, of New York, for "Apparatus for the Generation of Gas," the specification of which shows an apparently practical combination of water-gas apparatus and a lime kiln. The lime-kiln gas is passed through the water-gas generators and superheaters, and a portion of it, or as much as may be required, is reconducted to the lime kiln to burn the stone—that is, drive off the carbonic acid, which, by the method described in the Ellis invention, is again converted into the combustible carbonic oxide—a sort of gaseous perpetual motion in a sense, but conducted in a rational manner. It may be said, that the Ellis patent mentioned was issued after the Eldred one just reviewed; the former was filed first.

In addition to the patents mentioned, there is another (No. 795,257) to Eldred and Ellis, for "Process of Gas Generation," in which a lime kiln and producer figure; the idea being to make producer gas having proportionally more carbon and less nitrogen in its composition—thus yielding a more powerful gas, especially when used in gas-engines.

Patent No. 795,258, of July 18, granted to Carleton Ellis, is for a "Gas Producer Apparatus" embodying the general principles described in the preceding apparatus; but, in addition, it shows same as applied to the propulsion of vessels. All these patents indicate a thorough knowledge of the subject, and no doubt deserve classing as real inventions, notwithstanding the much earlier experiments and published experiences of Mr. M'Millin and the writer, which have been alluded to.

But, had the combined Gas Associations organized the "American Gas Institute" mentioned by Mr. G. A. Thwing, in his Presidential Address to the Western Gas Association last year, the M'Millin and Egner ideas, and many others, could have been tried to a finish, and classified either as practical, commercial successes or as only having been interesting and attractive theories, and the sum of the whole subject would have been known a decade ago. And had there been a well-established "Bureau of the Archæology of the Gas Industry," the inventors named would possibly have been able to profit by it to the ultimate benefit of mankind.

Only about three months since a patent was issued for a certain arrangement of mouthpieces and ascension pipes of gas-retorts, which the writer had in operation on five benches of eights 22 years before. Had we had the Bureau named, and were young, aspiring gas engineers obliged to study the records, or could they refer to them, a certain gas company would have saved not only the cost of the patent, but several dollars besides. It seems that a certain ancient author was right when he said: "And there is nothing new under the sun." He might have added: "But experience is not appreciated by fools, though an expensive teacher."

---

**Waverley Association of Gas Managers.**—The 89th half-yearly meeting of this Association will be held in the Masonic Hall, Loanhead, next Thursday, under the presidency of Mr. James Tulloch, the Manager of the Loanhead Gas Company. According to the programme issued by the Hon. Secretary (Mr. W. Young, of Penicuik), the business will consist as usual of an address by the President and the discussion of any points arising upon it; and it will include the fixing of the places for the half-yearly meetings next year. The members will dine together at the close of the meeting, and subsequently drive, in brakes provided by the Gas Company, to the Burdiehouse Lime-Works.

**Board of Trade "Commercial Intelligence" Advisory Committee.**—The five years for which the Advisory Committee on Commercial Intelligence was appointed in 1900 having terminated on May 24 last, the President of the Board of Trade has appointed a new Committee for a further period of three years, to continue the work. Among the members of the Committee is Mr. J. H. Birchenough, C.M.G., who, as our readers may remember, is a Director of the Imperial Continental Gas Association and of the Continental Union and Danish Gas Companies; and he was deputed by the Government about two years ago to proceed to South Africa to report on the commerce available there to British enterprise. The terms of reference are as follows; but pending the consideration by Parliament of the Bill introduced just before the close of the session for the creation of Secretaries of State for Trade and Local Government, they can only be considered as of a provisional character: "To advise the Board of Trade on the work of their commercial intelligence branch, and on such matters relating to foreign tariffs and other commercial questions as the Board may refer to them. To improve the means of obtaining and diffusing information for the benefit of British trade by means of commercial missions and correspondents abroad, and otherwise, as they may think fit."

**American Gaslight Association.**—The last number to hand of the "American Gaslight Journal" contains a list of papers prepared for presentation at the meeting of the American Gaslight Association at Milwaukee, on the 18th and 19th prox., under the presidency of Mr. E. G. Cowdery, of St. Louis (Mo.). Mr. A. E. Forstall, of New York, will deal with "Methods of Charging for Gas;" Mr. J. S. M'Ilhenny, of Washington, will take up the subject of "Condensation;" "High-Pressure Distribution to Date" will be considered by Mr. H. L. Rice, of Aurora; Mr. C. H. Dickey, of Baltimore, will review the improvements which have been effected in consumers' meters; and the "Taxation of Gas Companies" and "Municipal Ownership" will be discussed respectively by Mr. George M'Lean, of Dubuque, and Mr. B. F. Lyons, of St. Louis. A special feature of the meeting will be a lecture by Professor B. H. Meyer, of Wisconsin University, on "The Relativity of Economic Institutions." The Professor, in a communication he has made to the officials of the Association, says he hopes to "discuss the functions of the State and their limitation with reference to the nature of government; touching upon the position of the individual in the State, and observing national differences and similarities." In connection with the position of the individual, something may, he thinks, be said about competition and its limitations. Restrictive legislation affecting insurance, stock and produce exchanges, speculation, &c., in the different countries, may be briefly outlined, as illustrative of "relativity" in their workings. And finally, the question of public ownership may be discussed in the light of the propositions previously mentioned.

# SOURCES & COMMERCIAL VALUE OF THORIUM.

In the "JOURNAL" for the 7th of February (p. 360), we gave some interesting particulars in regard to thorium minerals, taken from a series of reports on results of the mineral survey in Ceylon in 1903-4, by Professor Wyndham R. Dunstan, M.A., F.R.S., the Director of the Imperial Institute. The discovery of an important source of thoria available for use in this country in the new mineral thorianite, and the possibility of this material being used in the manufacture of mantles for incandescent gas lighting, naturally created considerable interest; and inquiries were received in regard thereto. It was therefore decided to publish a general statement on the subject; and it is contained in the Institute's "Bulletin" No. 2 for the present year.

The writer begins by giving a list of the best-known minerals —fourteen in number—which may be regarded as sources of thorium, and then points out that only monazite has been found in such quantities as to make the commercial extraction of thoria possible. It is from monazite that practically all the thoria of commerce is derived at the present time; and a description of this mineral follows. Thorianite—the mineral found in Ceylon—has so far not been recorded outside that island, where its mode of occurrence and distribution are now being investigated. An account of this material is given, together with the analyses of the two specimens of it which were published in the number of the "JOURNAL" already referred to. The remainder of the minerals named in the list are of rare occurrence, and are for the most part poor in thoria. Their characteristics are, however, briefly indicated; and then the writer proceeds to consider

### THE COMMERCIAL UTILIZATION OF THORIUM MINERALS.

The thorium contained in the minerals described in the perceding paragraphs alone determines their commercial value; since although various uses have from time to time been suggested for a number of the associated constituents, these are of little importance from a commercial point of view. The only use to which thoria has been applied on a large scale is for the manufacture of mantles used in incandescent gas lighting, though quite recently various medicinal applications of thorium salts have been suggested. The utility of thoria in the gas-mantle is due to the fact that it emits light—that is, becomes incandescent, at a comparatively low temperature.

The thoria for use in the manufacture of incandescent gas-mantles is always put on the market in the form of the crystallized nitrate; and this is at the present time prepared almost exclusively from monazite, though lately thorianite has also been used as a source. The monazite and monazite sand of commerce are very complex mixtures. Thus, a specimen of Carolina monazite was found to contain the following extraneous minerals: Tetradymite, brookite, quartz, anatase, chromite, corundum, tourmaline, pyrope, zircon, epidote, fibrolite, columbite, samarskite, xenotime, montanite, fergusonite, rutherfordite, talc, tremolite, magnetite, limonite, menaccanite, hæmatite, asbestos, cyanite, rutile, and actinolite. The best washed monazite of commerce contains from 35 to 70 per cent. of cerite earths, from 0 to 5 per cent. of yttria earths, and from 0 to 9 per cent. of thoria; while the best monazite sand contains from 50 to 90 per cent. of monazite, equivalent to from 1·5 to 5 per cent. of thoria.

### COMMERCIAL PREPARATION OF THORIUM.

The details of the methods used in the commercial preparation of thorium nitrate from the mineral are not well known; but the following are outlines of processes which have been proposed from time to time. The mineral is first treated with twice its weight of hot concentrated sulphuric acid, whereby the phosphates of the rare earths pass into solution. This process is greatly accelerated if the dry sand is introduced into the hot acid. The whole is heated slowly until the mass sets to a thick paste, when either the heating is continued to dryness, or the mass is allowed to cool, and then extracted with cold water. The aqueous extract consists mainly of phosphoric and titanic acids, and the sulphates of cerium, thorium, yttrium, and iron. The residue consists of the difficultly soluble silicates and silica, ilmenite and magnetite. More recently a method involving the electrical fusion of the sand with coke is stated to have been successfully applied. This process may be used with residues poor in thoria or directly with the sand. The fusion takes place in graphite crucibles of 0·75 litre capacity surrounded by fire-brick. The crucible itself forms the cathode; the anode is a carbon rod, 40 mm. thick. Carbides (and some phosphides) of the rare earths are formed, from which soluble salts are readily obtained. The advantages of the method are its rapidity and the non-formation of phosphoric and silicic acids.

Many methods for treating the solution obtained by either of these processes have been patented. According to Kosmann's process the solution is just precipitated by ammonia and then slightly acidified with hydrochloric acid. On treating with sulphuretted hydrogen, and allowing to stand for twenty-four hours, the iron and aluminium are precipitated, together with sulphur and most of the didymium, if proper concentrations are employed. The solution is then decanted, and ammonia, ammonium citrate, and hydrogen peroxide added. This produces a precipitate consisting principally of thorium hydroxide, but still containing some alumina and cerite earths. Other processes consist in making use of the difference in solubility of the oxychlorides or sulphites of thorium and cerium.

In the preparation of the nitrate from the crude thoria thus obtained, the oxalate is first prepared. By precipitating the thoria two or three times as oxalate, it is possible to obtain a product almost entirely free from cerium earths and other impurities. The oxalate is dissolved in strong nitric acid, diluted, and allowed to crystallize *in vacuo*. It is generally dried at 100° C, and then forms the "thorium nitrate" of commerce. This product should contain about 47·5 per cent. of thoria.

From the point of view of ease of extraction, the new Ceylon mineral "thorianite" presents great advantages over monazite, since it may be directly converted into the nitrate by treatment with nitric acid.

The cerium oxalate produced as a bye-product is also employed in the manufacture of gas-mantles, which contain cerium oxide to the extent of 1 per cent. A small amount of this material is also used in medicine.

### THE MAKING OF INCANDESCENT GAS-MANTLES.

Mantles for incandescent gas lighting consist of an intimate mixture of 99 per cent. of thoria with 1 per cent. of ceria. They are made in the following manner: A cylinder of suitable length, made of "net" prepared from cotton, ramie, artificial silk, or other similar material, is taken, and the end sewn together by an asbestos thread. A loop of the same material is fixed across the constricted portion, as a means of support on the carrying rod, which is usually fixed centrally to the burner-head. The fabric is soaked in a solution of thorium and cerium nitrates, mixed in the proportions of 99 to 1, until the microscopic fibres of the "net" are filled with the liquid. Owing to the acid nature of the solution, a longer soaking is undesirable, as it renders the fabric weaker and more difficult to handle. The mantle is mechanically squeezed, to free it from the liquid adhering to the outside of the fibres, and is then stretched over conical moulds of the required shape, and allowed to dry in a warm atmosphere. It is now ready for "burning off."

On the proper carrying out of this process much of the ultimate success of the mantle depends. The flame of a burner is applied to the top of the mantle; the fibre gradually burns downwards; and the nitrates are converted into oxides. The shape of the mantle largely depends on the regularity with which the combustion takes place. A certain amount of carbon is generally left behind, which is burnt off by means of a bunsen flame. The process of "burning-off" mantles is nearly always done by hand. Machines have been introduced for the purpose of performing the operation on a large number of mantles at once; but they give less satisfactory results. The very fragile "burnt-off" mantles are temporarily strengthened by dipping them in a solution of "flexile collodion." The collodion is burnt off by the consumer applying a light to the bottom of the mantle.

### SUBSTITUTES FOR COTTON.

Many substitutes for cotton, which was first employed for the construction of the "net," have been tried with varying success. Mantles made from artificial silk fibre have given good results; but the cost of production of the fibre is a drawback to its general use. The nitrates are well mixed in the "collodion" solution, which is passed through very narrow glass tubes of 0·01 mm. bore. Ten or twelve of such fibres are twisted into one thread, which is denitrated by one of the usual processes, forming a base of artificial silk impregnated with the nitrates of the earths.

A "burnt-off" thread of this nature appears under the microscope as a loose bundle of rods of oxide; that from cotton "net" shows a dense fluted column of oxide, surrounded by a spongy mass. This difference seems to account in a very large degree for the difference in the life of the mantles. A mantle made from an artificial silk fibre is stated to retain its light-giving power much longer than that from a cotton mantle.

A considerable improvement has been introduced during the last few years by the substitution of a naturally-occurring fibre—ramie—for cotton. This gives considerably more ash on burning than most cottons, and mantles made from it contract less in "burning-off" and are stronger than those made from cotton. Ramie, moreover, absorbs less of the rare earth mixture than does ordinary cotton.

### THE CAUSES OF VARIATION IN MANTLES.

In using incandescent mantles, it is generally found that the illumination increases for a certain period, and that then a steady fall sets in. Irregular fluctuations in the illuminating power are also to be observed. These latter have been shown to be due to variations in the calorific power of the gas. The initial steady rise is probably due to the gradual shaping of the mantle to the flame. The subsequent fall has been shown to be occasioned by two causes. Dust particles of silica are carried by the draught against the mantle, where they form, with the oxides, infusible silicates having small emissive power. A more potent cause is the gradual volatilization of the ceria, to which the whole of the incandescence is due. Some manufacturers have succeeded in greatly lessening the rate of loss of ceria; and their mantles retain their efficiency for very long periods. It has been

shown, too, that the hygroscopic state of the atmosphere has a small though perceptible influence on luminosity in mantles.

SOME EARLY INCANDESCENT GAS-LIGHTS.

The production of light by heating refractory bodies dates from the invention of the Drummond lime-light in 1826. Since that time up to the taking out of the first Welsbach patent in 1885, many attempts at producing a satisfactory incandescent light were made, and of these Clamond's mantle was probably the most satisfactory. It consisted of threads of calcined magnesia on a platinum cage, which was heated by a mixture of coal gas and air under pressure. Auer von Welsbach's second patent, in 1886, covered the use of thoria alone or mixed with zirconia, yttria, magnesia, erbia, didymia, lanthana, or alumina. The exact date when the importance of ceria was shown is not known. Haitinger found, on working with thoria, that the purer the thoria, the less intense the light, and that quite pure thoria gave no light. His purification had consisted in a separation of the ceria earths. In 1890, incandescent gas lighting again became prominent; mantles consisting of 99 per cent. of thoria and 1 per cent. of ceria being demonstrated to be satisfactory. Such a composition is found to give a maximum illumination; and it is in general use at the present time.

THORIUM AND CERIUM THE ONLY USEFUL CONSTITUENTS.

The substitution of thoria by any of the other earths has been generally found to be deleterious, though a certain amount of success has been obtained with mantles consisting of a base of thoria and zirconia, dipped in a 99·1 thoria-ceria solution and ignited. In endeavouring to find a substitute for thoria, other points besides the power of light-emission must be considered. Some nitrates shrink too much when converted into oxide. Thorium nitrate, on the contrary, swells considerably during the process; so much so, indeed, that if cerium nitrate is present, the percentage of ceria by volume after ignition sinks as low as 0·1 per cent. Some oxides slowly volatilize; some undergo partial fusion; others give a coloured light. From all points of view, thoria at present stands unrivalled. One of its most valuable properties is its extremely small radiating power for heat. It is for this reason that it is able to attain so high a temperature; and this accounts very largely for the brilliancy of the light obtained.

There have been several theories to account for the influence of the very small amount of ceria on the light-giving properties of the mantle; and the matter cannot yet be said to have been definitely settled. The assertion of Auer von Welsbach that "the invention is founded, above all, on the fact, proved by numerous experiments, that molecular mixtures of certain oxides are possessed of properties which cannot be deduced from those of their constituents," is another way of stating the problem at issue, but affords no explanation of the fact.

Cerium is capable of assuming several states of oxidation, and Welsbach has suggested the explanation that a very large number of alternate oxidations and reductions take place, which give rise to a series of molecular shocks, and hence to light-emission. Chromium, which also has two oxides, will behave similarly to cerium, with an alumina basis in place of thoria; and in this connection Welsbach points out that thorium and cerium, and aluminium and chromium are isomorphously replaceable in many of their compounds. The very limited range in the amount of ceria that may be present seems to militate strongly against Welsbach's theory of the action.

RECENT VALUABLE DISCOVERIES.

Though comparatively small quantities of these oxides, thoria and ceria, are used in the construction of each mantle, the number of mantles used is so enormous that the total trade in monazite and in thorium nitrate attains a considerable volume. Unfortunately, owing to the specialized character of the manufacture of thorium nitrate, and as the result of the restricted range of distribution of monazite, the trade in these products has become to some extent a monopoly. From this point of view, the discovery of thorianite and other thorium-bearing minerals in Ceylon, and of monazite in Southern Nigeria, by the mineral surveys now being carried on by the Imperial Institute, is of great importance as affording new sources of thoria.

---

**The Wales and Monmouthshire District Institution of Gas Engineers and Managers** will hold their first general meeting to-morrow, at Cardiff. The chair is to be taken by Mr. Thomas Canning, M.Inst.C.E., the Engineer and Manager of the Newport (Mon.) Gas-Works. The first business to be transacted is to settle the rules of the Institution; and for the purpose of enabling the members to duly consider the matter, a draft set of rules has been circulated among them by the Council. The President will then deliver an address, and two papers will afterwards be read and discussed—(1) "A Few Notes on Stoking Machinery," by Mr. Edward Jones, of Pontypridd; (2) "Incandescent Lighting," by Mr. Thomas Acland, of Llanelly. At the close of the proceedings, Mr. Canning has invited the members to "high tea" at the Park Hotel. The circular convening the meeting (signed by the Hon. Secretary, Mr. Octavius Thomas, of Pentre) closes with the intimation that, "as this is the first meeting, the President and Council hope all the members will endeavour to attend, so as to make it as successful as possible."

## THE USE OF GAS IN MODERN MOTOR SHOPS.

A correspondent of the "American Gaslight Journal" wrote recently to point out that the extensive development of automobile construction and the repair industry has noticably increased the use of gas in connection with the brazing, tempering, and enamelling operations involved. On a visit to some of the leading motor shops of the country, he found the gas consuming apparatus in use exhibited in the accompanying illustration. Not only is there an increased consumption of gas in the automobile shops, but in other industrial shops in which there is need of departments of brazing, tempering, &c. Ten years ago the employment of gas in these directions was so limited that it cut a very small figure in the total consumption; but to-day the quantity of gas thus consumed amounts to "quite a little."

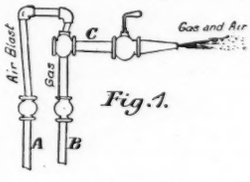


Fig. 1.

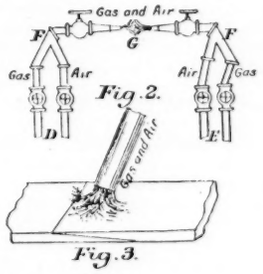


Fig. 2.



Fig. 3.

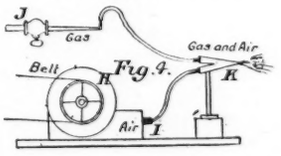


Fig. 4.

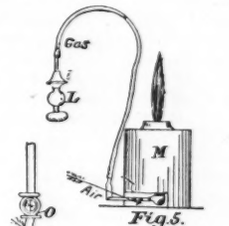


Fig. 5.

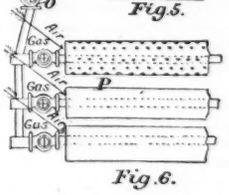


Fig. 6.

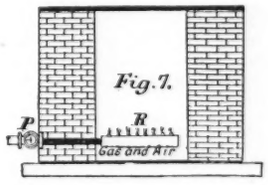


Fig. 7.

Taking the brazing first, apparatus of the description shown in the first of the diagrams is as a rule used. In fig. 1 the principle of combining the gas with air is shown. Ordinary illuminating gas is drawn from the pipes of the shop into the combining or mixing nozzle, through the pipe B. Sometimes vaporized hydrocarbons, such as gasoline or petroleum are used for this purpose instead of house gas. The object is to mix the gas and the air. The air is admitted to the mixing nozzle through the pipe A. A blast or other power is utilized for forcing the air to the right point for proper mixture and combustion. The air blast and the gas fumes combine at the pipe C and pass forward to the nozzle. A check-valve controls the flow of the combined properties. The mixture which occurs is quite complete; so that a perfect jet can be burned at the end of the outlet of the nozzle. This blast is directed upon the objects to be brazed, and thorough heating and brazing usually result.

Then again, in some of the shops the combination of air and gas mixture was effected by means of the double-flame device represented in fig. 2. Here the same principles are applied to the two sides of the arrangement. The air blast and the gas are admitted through leaders D and E on either side, to the V-shaped unions at F. Here the gas and air mix and are carried by the force of the air-blast forward to the nozzle tips. Ignition occurs, and the mated flames combine at G. The intensity of the heat of the flames thus combined is very severe and effective; and brazing can be depended upon in quick order.

Usually the heating of the joints by the brazing process with the gas and air burners is accomplished as illustrated in fig. 3. The parts to be brazed are held so that the laps join closely, and then the stream of fire is directed straight against them as shown. The parts to be united may be wired if desired to hold them in place until the union results. The edges of the joint should be heated as thoroughly as the inside parts. The parts may be turned so as to allow the flame to contact with the different surfaces. The project of getting the air-blast to work in conjunction with the gas-flow is sometimes annoying to the workman.

In fig. 4 is a simple blast constructed with the articles usually found about the shop. The fan wheel in the blower H is made of a shaft 1 inch diameter, and long enough to carry the fan and the wheel driven by the belt. This shaft revolves in box-bearings set for the purpose. The wheel for the belt is keyed or set-screwed on as shown. The fan wheel consists of the hub of metal fitted to the shaft; and projecting from this hub are several fans or blades of sheet metal about 2 inches wide at the top and of the right length to permit free turning within the case H. The case is made of sheet iron. An end is left open, so that the rapidly revolving fan-wheel can draw in the air by suction and

force it forward out of the pipe I to the mixing nozzle at K. Then the house gas is taken through the pipe J to the same mixing point. The correspondent refers to the application of illuminating gas to the service of case-hardening operations in shops.

The process of heating the metal parts for tempering to a cherry red is effected in a very simple way, providing that a light expenditure is preferred. Fig. 5 is a sketch of one of the home-made contrivances noticed in practical service for this line of work. A common form of sheet metal can be made as shown. This is about 20 inches high and 12 inches in diameter. It is marked M. There is a slit cut in the base of the can on one side, so that the gas jet can be admitted. The gas is taken from the jet L, and is carried to the burner by means of the rubber hose. The gas jet is ignited inside the can; and the necessary amount of air to mix with the gas to make an effective flame is received through the slit.

Then gas is also consumed in the enamelling departments of shops, harness works, &c. Fig. 6 is a drawing of the common process of utilizing gas with air for this purpose. There is a combination of one, two, three, or more pipes P, each about 3 inches in diameter and long enough to afford effective heating for the apartment in which the pipes are adjusted. These exterior pipes are drilled with small holes at 1-inch intervals. The air and the gas combine within the pipes, and form jets for ignition at each bore. Therefore many little jets of flame result, and an equal distribution of the generated heat occurs. The gas is received through the pipe O, which connects with the main, and is admitted to the 3-inch pipes at the open ends, as shown. The air makes a passage for itself into the open pipe ends, being assisted by the indrawing movement resulting from the departure of the air and gas through the burners.

The method of applying this device to the enamelling oven is shown in fig. 7. The parts in process of surfacing with enamel are dipped in the tanks containing the coating ingredients. Then the parts are drained off, and are then hung up in the bake-oven on hooks just over the line of flames produced by the bores of the pipes. The ovens are erected of brick or sheet metal. The pipe admitting the gas to the burner is usually placed through the masonry at P. The pipes of the burners are represented at R.

Thus we see, says the writer, in conclusion, that gas is finding a use for itself on practical lines in some of the newest of industries. In some, where gas was discarded for the electric light, the gas-pipes are kept, in order to furnish gas for various mechanical processes.

## ENRICHMENT OF GAS WITH BENZOL.

### Some American Experiments.

At the Annual Meeting of the Western (U.S.A.) Association, a paper on the "Practical Enrichment of Low Candle Power Gas with Benzol" was read by Mr. F. B. Wheeler, of Syracuse. In the course of it he gave the following particulars of some experiments which had been carried out in America.

In the spring of 1904, an installation was made at a plant we will call A. In May, the output was 21,866,400 cubic feet, or 705,368 cubic feet per day. For the purpose of this experiment, the initial power was 13·48 candles, which was brought up to 18·55 candles—a rise of 5·07 candles by the use of 0·207 gallon of benzol, or 0·0408 gallon per 1000 cubic feet per candle. To put it in another way, the number of cubic feet raised 1 candle by 1 gallon was 24,491. This experiment extended over thirty days; and during this period the gas was kept at the following average chemical composition: $CO_2$, 2; $C_6H_6$, 0·8; $C_2H_4$, 3·9; $O_2$, 0·3; CO, 5; $CH_4$, 39·6; $H_2$, 39; N, 9·4—total 100. Before enrichment its calorific power was 667 B.T.U. gross; after enrichment, 675 B.T.U. gross.

During the next fifteen days (June 3-16), the amounts of oxygen and nitrogen were purposely increased to reduce the heat units and flame temperature, with the following results:—

| Candle Power. Initial. | Candle Power. Enriched. | Gallons Benzol Used. | Gallons Benzol per 1000 C. Ft. Gas. | Candles Enriched. | Cubic Feet of Gas 1 Gallon 1 Candle. |
|---|---|---|---|---|---|
| 12·90 | 18·27 | 193·57 | 0·2010 | 5·27 | 26,709 |
| 14·02 | 18·40 | 112·23 | 0·1370 | 4·38 | 31,965 |
| 15·71 | 18·67 | 112·23 | 0·1339 | 2·96 | 22,102 |
| 13·12 | 17·70 | 185·31 | 0·2121 | 4·58 | 21,587 |
| 12·80 | 18·16 | 171·39 | 0·2024 | 5·36 | 26,473 |
| 15·12 | 18·24 | 73·95 | 0·0906 | 3·12 | 34,414 |
| 15·83 | 17·74 | 46·11 | 0·0535 | 1·91 | 35,648 |
| 11·14 | 18·20 | 301·89 | 0·2793 | 7·55 | 20,222 |
| 11·25 | 18·14 | 314·07 | 0·3110 | 5·89 | 31,407 |
| 13·90 | 17·76 | 136·59 | 0·1322 | 5·86 | 29,189 |
| 15·06 | 18·58 | 148·77 | 0·1486 | 3·52 | 23,683 |
| 14·75 | 17·45 | 167·88 | 0·1171 | 2·70 | 23,045 |
| 13·32 | 17·85 | 168·78 | 0·1697 | 4·53 | 26,690 |
| 12·94 | 16 84 | 194·88 | 0 1927 | 3·95 | 20,553 |

During the tests the following results were obtained:—

| | |
|---|---|
| Initial candle power | 13·70 |
| Enriched candle power | 18·00 |
| Increase in candles | 4·30 |
| Cubic feet of gas | 13,066,800·00 |
| Gallons of benzol used | 2,267·65 |
| ,, ,, ,, per 1000 cubic feet | 0·1735 |
| 1 gallon enriched 1 candle | 24,783· cub. ft. |

The average chemical composition of the enriched gas was: $CO_2$, 2; $C_6H_6$, 0·8; $C_2H_4$, 3·3; $O_2$, 1·6; CO, 5·3; $CH_4$, 40; $H_2$, 35·7; N, 11·3—total 100. Before enrichment the calorific power of the gas was 645 B.T.U. gross; after enrichment, 655 B.T.U. gross. The gas was pumped through a 10-inch main a mile long; and at the point of delivery, after purification, it did not show any change in candle power. The above experiments were made in late spring. The effects of cold remained to be determined.

Ordinary coal gas of 18-candle power usually carries at least 1 per cent. of benzene; and it has been transmitted through mains with extreme conditions of temperature for many years with no extraordinary loss. Mr. Butterfield, in his "Chemistry of Gas Manufacture" (Ed. 1896, p. 149), says: "There appears to be ample margin, even at 0° C. (32° Fahr.), for the retention in gas of sufficient benzol vapour to give it an illuminating power of 25 candles." We may confidently expect, then, to find no more loss or condensation than with unenriched high-grade coal gas or cannel coal gas. It was deemed desirable to confirm the previous test in very cold weather. An opportunity was offered at Plant B. It was decided to test the candle power of the gas at the start and after it had travelled several miles through a very shallow pipe and in zero weather. The output from this particular works was pumped through a 16-inch main more than two miles long, laid at least a mile just under the paving-stones. Arrangements were made to take the temperature of the gas flowing in the mains, also to read constantly the candle powers at both ends. During the journey of the gas it was under about 2 lbs. pressure.

Experiments were made to determine absolutely the drop of candle power of the gas entirely unenriched, and transmitted under varying conditions. The gas was then enriched by benzol to different candle powers—some as high as 23—and transmitted under like conditions. The temperature of the gas at the station meter varied but slightly from 60° Fahr.; that of the gas flowing through the shallow main was 37° Fahr.—a drop of 23° from the station meter. The gas was delivered at a temperature of 42° to 47° Fahr. through a section of deep-laid cast-iron 20-inch main. The outside air temperature varied from −15° to 34° Fahr., and the ground was frozen to a depth of 3 feet.

The loss in transmission was determined; then enrichment began under the same conditions as before. The results were as follows:—

| Day. | Initial Unenriched. | Enriched. | Raise in Candles. |
|---|---|---|---|
| 1 | 11·87 | 20·05 | 8·18 |
| 2 | 13·05 | 19·64 | 6·59 |
| 3 | 14·45 | 20·72 | 6·27 |
| 4 | 14·98 | 20·98 | 6·00 |
| 5 | 14·66 | 20·77 | 6·11 |
| 6 | 14·14 | 20·80 | 6·66 |
| Average | 13·86 | 20·49 | 6·63 |

The average amount of benzol used was 0·3285 gallon for a 6·63-candle rise, or 1 gallon raised 20,000 cubic feet an average of a candle. The temperature of the main remained constant at 37° Fahr. The average loss in candles at the end of the long travel under 2 lbs. pressure was 0·28 candle.

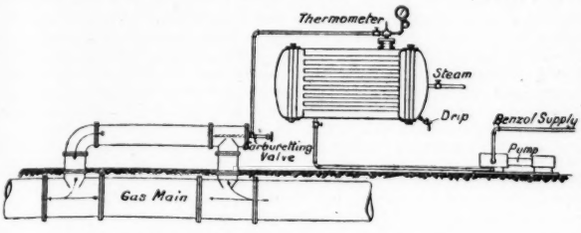
*Second Period, Consecutive Days.*

| Day. | Initial Unenriched. | Enriched. | Raise in Candles. | Benzol Used. |
|---|---|---|---|---|
| 1 | 13·20 | 20·59 | 7·39 | 0·3399 |
| 2 | 13·00 | 19·92 | 6·92 | 0 3182 |
| 3 | 13·03 | 20·38 | 7·35 | 0·3308 |
| 4 | 13·21 | 20·47 | 7·26 | 0·3484 |
| 5 | 14·01 | 20·35 | 6·34 | 0·2917 |
| 6 | 16·18 | 20·89 | 4·71 | 0·2356 |
| 7 | 16·09 | 20·90 | 3·81 | 0·1957 |
| 8 | 15·07 | 19·26 | 4·19 | 0·1926 |
| Average | 14·22 | 20·34 | 6·12 | 0·2516 |

The average amount of benzol used was 0·2816 gallon. The average rise of candle power was 6·12 candles, equal to 0·0460 gallon to raise 1000 cubic feet 1 candle, or 1 gallon raised 21,739 cubic feet 1 candle. The average loss in transmission was 0·24 candle. The figures here obtained were checked at a third plant having the same length of pipe-line and under like general conditions. The temperature of the main was exactly the same—37° Fahr. The gas here had an average initial candle power of 8·15; it was raised 9·22 candles to 17·37 candles (measured at its two-mile journey's end) by 0·384 gallon of benzol; giving thus an enriching value of 24,039 cubic feet raised 1 candle from 1 gallon. Further experiments have since been made to determine the value of benzol for enriching very lean gas, containing as high as 2 per cent. of oxygen. For four days in Plant B the average initial candle power was held at 6·94; the rise was 11·48 candles; and the enriching value with this high percentage of air was 22,000 cubic feet per gallon. At a fourth plant the benzol enriched gas was pumped under pressures varying from 7½ to 10 lbs. through a 12-inch main 38 miles long. The gas had an average initial candle power of 14, was raised to 18·8 candles, and after its long journey arrived (under pressure) at 18·6 candles—a loss of only 0·2 candle. Later, under somewhat different conditions, the loss was an average of 0·8 candle.

The quickness and ready convenience of the method will commend itself to all from the following description: The diagram shows a complete enriching plant. The benzol is fed to the vaporizer from a suitable measuring-tank by a small duplex pump. The vaporizer consists of a boiler in which the oil is kept

outside the steam-heated tubes. These tubes have sufficient surface to evaporate, in the plant shown, enough benzol to enrich 3,000,000 cubic feet of 6-candle coal gas 12 or 14 candles. The plant occupies a ground floor area of scarcely 4 feet by 9 feet.




BENZOL CARBURETTING PLANT.

The vaporizer has a vapour pressure-gauge on the top, also a thermometer. With a steam pressure at the plant of 80 to 100 lbs., and a vapour pressure of 30 lbs., a temperature of 130° C. to 444° C. (284° Fahr.) is maintained. The vapour passes through a carburetting needle-valve into a small bye-pass on the gas-main. The gas-flow sweeps the vapour along into the gas flowing in the main.

The steam is first turned into the vaporizer; then the benzol pump is started; and the needle-valve is opened when the vapour pressure-gauge shows (say) 10 lbs. pressure. This operation in the vaporizer shown here does not take more than five minutes. The vapour pressure is usually carried at a point from 20 to 30 lbs. A steady flow of vapour passes into the gas main as long as the steam pressure is maintained. The volume of benzol vaporized, and consequently the amount of enricher fed, are regulated by the needle-valve opening, the pump-speed, and the steam-valve opening. The amount of steam used is nominal, as all pipes and the vaporizer are lagged.

The method is speedy—almost instantaneous, in fact—economical to operate, requires no extra labour, and in five minutes can raise a 6-candle, blue air-coal gas to 16, 18, or more candles with an amount of oil equivalent to about 0·04 gallon per candle per 1000 cubic feet.

In America, gas companies, especially the smaller ones, have hitherto had their choice of methods of enrichment confined to the use of cannel coal, water gas, or of some form of oil gas generated in their benches. At present, the use of cannel coal enrichment is nearly obsolete, on account of the price of cannel as well as of the irregularity and uncertainty of the candle powers obtained, and because of the deterioration in the quality of coke produced when cannel is used. Most small gas companies cannot afford the capital cost of a small water-gas installation simply as an enriching adjunct to their plants. The uses of most of the forms of oil gas enrichment are extremely wasteful and expensive. The cost of the enrichment per candle is in many small coal-gas plants extremely high; the writer knowing of plants where it has been as high as 5c. per candle. No small gas plant should have an enriching cost above 1·25 c. per candle.

The method of benzol enrichment outlined above possesses all the elements desired by most small gas plants for speedy, economical enrichment of their coal-gas. The rapidity and ease of starting up the apparatus to full working capacity, its small steam consumption, its negligible labour cost, and its low charge for interest, make up a combination that no other enriching system has. It will enable them to take off a much higher yield per pound of coal, and yet reach any reasonable desired candle power. Particular attention is called to this feature permitted by the installation of the benzol method. The first cost of the enriching plant is small, its space requirement is a corner, and its simplicity is so apparent that it must commend itself to all managers requiring a coal-gas delivery above 15 candles, whose works are unable to instal an expensive enriching plant. For a small gas-works, the cost per candle of enrichment is lower by the benzol method than by the use of any other method of enrichment known to the writer.

## RAISING WATER BY COMPRESSED AIR.

The water supply of Los Angeles (Cal.) has hitherto been furnished by gravity; only a few of the higher parts of the city being supplied by pumping into the mains. The growth of the city, however, has now made an additional supply necessary, and a pumping plant is to be installed in the south-west part of the city, where wells have been bored to water-bearing strata lying from 60 to 200 feet below the surface. As these wells are too deep to permit of their operation by pumping-engines located on the surface, and as it was considered commercially impracticable to pump them by deep-well pumps with long plunger-rods, and very costly to excavate pumping-stations underground near the water level, it has been decided to operate them with compressed air. According to "Engineering Record," the twelve wells will discharge into a common reservoir, from which the water will be forced by a pumping-engine into the city water-mains. The water in the wells at present stands about 60 feet below the surface; but, as has been found in irrigation work in California, the ground level of subterranean water supplies is apt to be lowered considerably by continuous pumping, and the compressor has, therefore, been designed to pump, if necessary, from a much lower level—being guaranteed to deliver 2000 cubic feet of air per minute against a pressure of 100 lbs. The air-valves of the compressor are different from those of other compressors in that they combine the quietness and high-speed qualities of mechanically-moved valves with the elasticity of poppet discharge-valves. The Los Angeles machine will be of the two-stage type—that is, the air will be partly compressed in a large cylinder, after which it will flow through a cooler, where its temperature will be reduced by passing over tubes containing cold water, to a high-pressure cylinder, where the compression will be completed. The steam-engine driving the compressor, and forming, in reality, a part of it, the steam cylinders working on the same piston-rods, is also compounded. The steam expands first in a high-pressure cylinder, after which it passes to a receiver, where it is dried and reheated by high-pressure steam in pipes, after which it finishes its expansion in the low-pressure cylinder. The steam is then condensed in a surface condenser and returned to the boiler through reheaters by the boiler-feed pumps. The entire machine is supplied with oil from one central tank, and the oil going into the steam cylinders is afterwards removed by a separating device placed in the exhaust pipe. The automatic governor controls both the pressure of the air delivered and the speed of the engine—that is, if the consumption of air is reduced by the shutting off of wells, the engine slows down, maintaining a constant pressure, while if one of the air-pipes should break, the speed governor would prevent the engine from running above a certain speed.

## Producer Gas for Propelling Ships.

Writing to the "Pall Mall Gazette" last week on "The Passing of the Steamship," an engineering correspondent referred to the possibilities of producer gas as the motive power. After calling attention to the steps which have already been taken in the production of plant for utilizing this gas on board ship, he points out that the economy effected is claimed to be considerable—1 lb. of fuel used in this way being equal to 3 lbs. burnt under a boiler to generate steam. "This, on a long voyage," he says, "not only means a reduction of the coal bill, but also a corresponding increase in cargo space or passenger accommodation. It therefore behoves steamship companies to pause before adapting the steam-turbine in a wholesale manner." He goes on to say that "for ease of motion the gas-engine, as at present designed, will not compare favourably with the steam-turbine; but it is not outside the bounds of possibility that what Mr. Parsons and other inventors did for the use of steam in a rotary motor some other inventor may effect for the employment of gas in a like manner."

## Tarring the Surfaces of Roads.

In connection with the subject of the use of tar macadam for road making, which was dealt with in the last issue of the "JOURNAL" (p. 554), it will be of interest to record that at the last meeting of the Kent County Council the Bridges and Roads Committee reported that in several urban districts an attempt had been made to deal with the dust nuisance by painting the road surface with tar. The County Surveyor (Mr. H. P. Maybury) considered that the matter could be much more effectively dealt with in this way than by using any of the expensive dust-laying compounds now being sold. Moreover, two coats of good tar had the effect of preserving the road service and lengthening its life, whereas the watering done for sanitary purposes often caused damage to the road. He gave the average cost of painting with two coats of tar as 1d. per square yard. Towards the cost of watering, the Council made a contribution of one-third; but having regard to the beneficial effects of painting with tar, the Committee considered their contributions should be greater. They accordingly recommended that during the present financial year a contribution should be made at the rate of ½d. per square yard towards the cost which any urban authority retaining its own main roads might incur in painting the surface.

**Wooden Pipes.**—Another of those interesting discoveries which are periodically made in London when the streets are going through the process generally described as being "up," has, says a correspondent of the "Pall Mall Gazette," been made within the last day or two in a side-street off Great Portland Street (Oxford Street end). The excavators, in the course of their delving, have unearthed some wonderfully well-preserved specimens of the old wooden conduit-pipes. These pipes, which have lain for a century or more only a few feet below the surface, are beautifully drilled through their centres, and are practically in as good condition to-day as when first laid down. The wood has turned a very deep brown—almost black; but it is difficult to say what wood it is. It has the appearance and hardness of oak; but many woods, especially beech, would last quite as long under the circumstances.

# CORRESPONDENCE.

*[We are not responsible for the opinions expressed by Correspondents.]*

## Gasholder Capacity.

SIR,—The leader under the above title in your issue of the 29th ult. invites a few lines from me.

You comment on the omission as to whether the proposition is intended to apply only to towns in Ireland or is offered for general acceptance. Certainly I had my audience—the gas managers of Ireland—in view when preparing my remarks; and after the brisk fusillade to which I subjected myself, it is gratifying to read in your leader that "it may be conceded that in many small towns in Ireland 60 per cent. is, and will continue to be, sufficient storage." Large towns in Ireland can be numbered on the fingers of one hand without even requisitioning the thumb.

Considering the matter from a wider standpoint, however, I am not satisfied that I have much under-estimated the necessary storage, although the lower rate at which money is obtainable on this side of St. George's Channel may make a greater margin economically advisable. If the conventional rule of twenty years ago was then right, I contend that the changes I enumerated that have since occurred render a correction permissible in the direction I have indicated. Perhaps I have gone too far in suggesting 60 per cent. as enough; but I wanted to provoke a discussion, and have not been disappointed. If Manchester had to curtail pressure last winter with 92 per cent., then I unhesitatingly say that it was because the make of gas was deficient, not the storage.

In my opinion, gasholders should not be relied upon to make good the deficiency between actual demand and possible production. I may be wrong; but I consider that retorts under fire should at all times be adequate to produce more gas than, with reasonable foresight, is expected to be required. In a town subject to fogs, there is always the past to assist in forecasting probable requirements.

Of course, every local circumstance must be considered when deciding as to extensions, and rate of increase in consumption would be one, as also a succession of mild winters. But these considerations apply equally to producing plant as to gasholders.

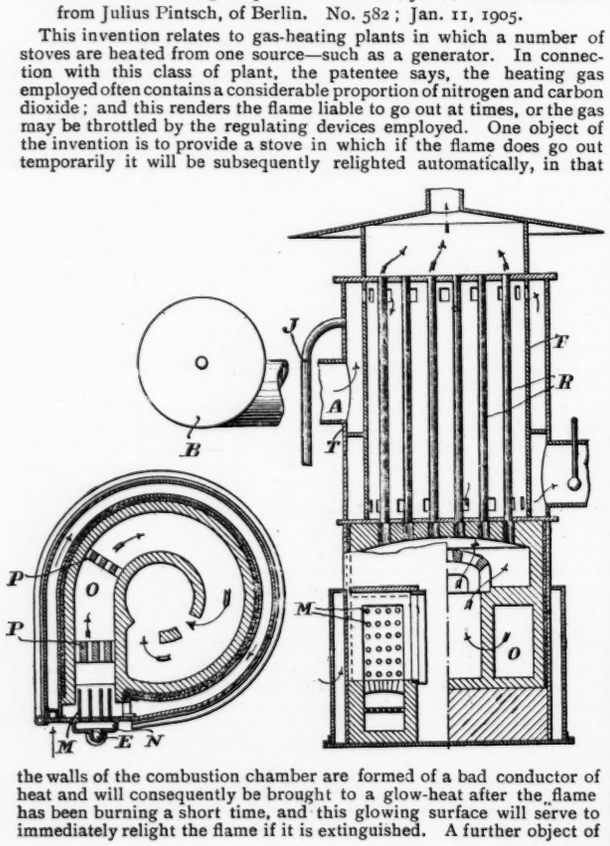
In conclusion, I would insist that it is much more economical to have a margin of retort power at a tithe of the cost than a margin of gasholder room. Given retorts, you can keep a town all right without a holder; but you will not reverse the operation for long, and I feel convinced that money is often spent on gasholders (which do not make gas) which could have been spent to better advantage extending or improving retorts (which do).

5, *Victoria Street, S.W., Sept.* 2, 1905. R. B. ANDERSON.

# REGISTER OF PATENTS.

**Gas-Stoves for Heating Purposes.**—Bousfield, J. E., a communication from Julius Pintsch, of Berlin. No. 582; Jan. 11, 1905.

This invention relates to gas-heating plants in which a number of stoves are heated from one source—such as a generator. In connection with this class of plant, the patentee says, the heating gas employed often contains a considerable proportion of nitrogen and carbon dioxide; and this renders the flame liable to go out at times, or the gas may be throttled by the regulating devices employed. One object of the invention is to provide a stove in which if the flame does go out temporarily it will be subsequently relighted automatically, in that

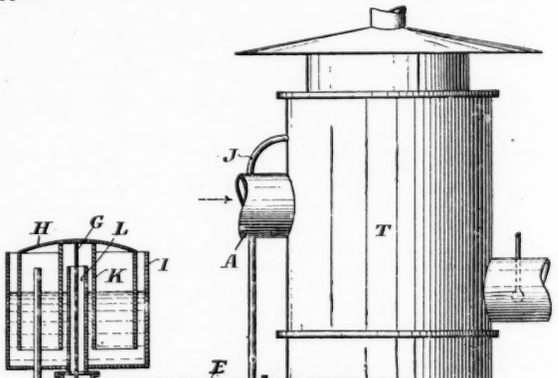



the walls of the combustion chamber are formed of a bad conductor of heat and will consequently be brought to a glow-heat after the flame has been burning a short time, and this glowing surface will serve to immediately relight the flame if it is extinguished. A further object of the invention is to provide means for controlling the gas-feed according to the pressure of air in the stove.

The illustrations are a vertical and a horizontal section through the stove, and an elevation of the stove showing the means for regulating the gas-feed according to the pressure of the air in it.

The stove is circular and provided with a lower hollow fire-door N, having a set of inwardly projecting burner pipes M for the gas, which is fed from the supply pipe E into the hollow door. The gas issuing from the set of burner pipes burns in the combustion chamber O; being provided with preheated air along the circular jacket which opens into the combustion chamber O at the right-hand side of the fire-door. This combustion chamber opens into a central chamber, and the hot gases pass up through the perforated cover of the chamber, and through a series of orifices in the roof of the stove proper, into and through the tubes R mounted in the air-heater cylinder T, and extending through the top and bottom plates in which the tubes are supported. Within the combustion chamber, two or more bridges P are provided having slots in them through which the gases pass. The bridges (as the walls of the chamber) are of a material which does not readily conduct heat; so that when the burners have been alight for a short time these parts will be brought to a glow-heat, and will relight the burners if for any reason these should be extinguished without the gas being turned off.

The air-heater T consists of this outer cylinder in which the air-inlet A and the air-outlet are provided. An inner cylinder encloses the pipes R, and a horizontally disposed partition wall is provided between the two cylinders extending between the air inlet and outlet. The inner cylinder is provided with rings of openings top and bottom; so that the air entering at A will first pass upwardly between the two cylinders, then through orifices at the top, downwardly among the pipes R to the lower openings, and out into the room to be heated. The air is forced through the stove by a ventilator B or other suitable appliance.



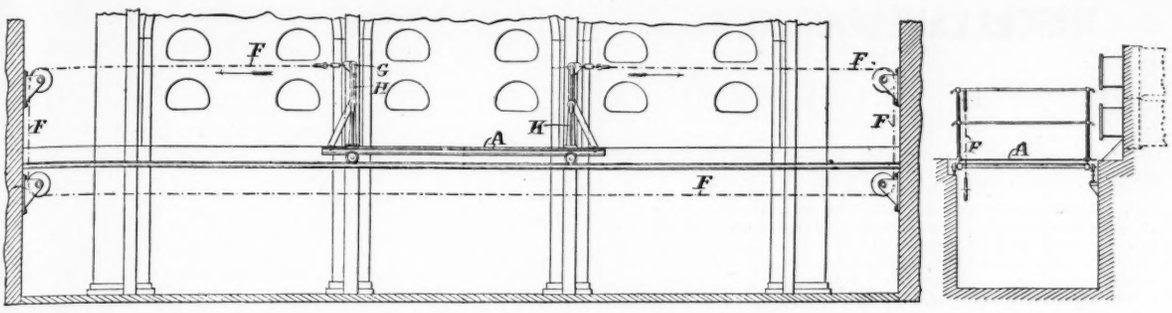

In order to regulate the gas-feed according to the pressure of the air being heated, the gas-feed pipe E to the hollow door of the stove joins with the gas-main C by means of a valve housing D, in which the end of the gas-main C is adapted to be closed by a valve F. This valve is attached to a bell H by a rod G, extending up through the pipe L, fixed in the tank I at the bottom and extending up to a point above the level of the liquid in the tank I. The bell is also provided with a downwardly extending cylinder K enclosing the pipe L, and thus forming a closed space beneath the bell into which a pipe J opens up, the other end of which is in communication with the interior of the air-heater T.

The operation of this part of the invention takes place in the following manner: If the ventilator B is not running, there will be no air-pressure in the stove, and consequently none will be communicated to the bell H through the pipe J. The valve F will therefore rest down on the end of the main C and cut off the gas feed. As soon as the ventilator is set going, there will be pressure in the stove; and this will be communicated to the bell, through the pipe J, and will raise the bell and lift the valve F off its seat and allow the gas to pass to the stove. In order to control the gas feed by the temperature of the room to be heated, a thermostat is advantageously employed.

**Travelling Platforms for Gas Retort-House Floors.**—Gibbons, W. P., and Masters, R., of Dudley. No. 19,307; Sept. 7, 1904.

The chief object of this invention is to combine with a travelling platform means for automatically guarding or fencing the portions of the gap or opening in front of the retort-bench which are not covered by the platform.

A is the ordinary travelling platform (adapted to travel along rails), covering over a portion of the cellar in front of and below the retorts. At each end of the platform is a protecting guard or fence, which may conveniently consist of a wire rope or chain F, one end of which, at G, is connected to the top of the pillar H or the like at one side of the travelling platform. The chain is carried horizontally over and under guide pulleys and then right over to the other wall E, where it passes up over other guide pulleys and is connected to the top of the pillar K, which is fixed to the side of the platform A. The chain or rope effectually

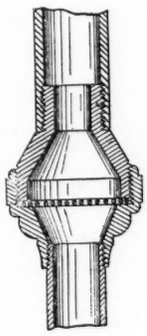



fences the parts of the cellar between the ends of the platform and the walls of the house; and in whatever position the platform may occupy, the gap on either side of it is effectually guarded.

Instead of the wire rope or chain F being in one piece, the part which fences the cellar opening at one side of the platform may be distinct from that which fences the opening at the other side of the platform, or the guards may be each formed of a set of bars arranged diagonally and jointed together like lazy tongs; one end of this being connected to the end wall, and the other to an upright pillar at the side of the platform, so that the lazy tongs fence will expand or contract as the platform travels along.

**Dust Retainer for Gas Pipes and Fittings.**—Smith, T. B., and the Sunlight and Safety Lamp Company, Limited, of Birmingham. No. 21,607; Oct. 8, 1904.

The patentees point out that in gas-fittings generally impurities, such as dust or the like, are carried along the various pipes, and in course of time impede the free passage of gas, particularly so when near the burners. Already attempts have been made to remedy this difficulty in the burners themselves—that is to say, filtering or the like devices have been made as part of the burners themselves; but they propose to provide an independent article, which may be connected up to any part of the piping, fitting, or burner, as required from time to time. It consists of two parts (as shown) screw-threaded to each other, and furnished in the interior with fine gauze or the like; the parts being also furnished on their exterior ends with screw-threads suitable to connect up to the pipes or fittings.



**Discharging Machines for Gas-Retorts.**—M'Kinlay, R., of Harleyford Road, Vauxhall, S.E. No. 21,655; Oct. 8, 1904.

This invention in discharging machines for retorts relates to a construction wherein, among other advantages, the packing and machined parts of the ram are kept out of the retort as far to the rear of the ram-head as possible.

The discharging machine comprises a constant-pressure ram so connected by chains to a telescopic ram or pusher that, when the pusher ram makes its working stroke, it overcomes the constant-pressure ram and pulls it in, while as soon as the operator relieves the pusher ram from the pressure of the main, the constant-pressure ram at once comes into operation and withdraws the pusher ram. The preferred form of pusher ram is made in two or more telescopic parts; and the head of the ram is carried by the larger or outside member, so that the first packing-gland or stuffing-box will be at the rear of the outside member and slide on the next section. This construction also allows of the stuffing-boxes being readily attended to and repaired, and keeps them as far as possible out of the retort. There is, further, a guide so mounted and actuated that it is pushed forward into or against the mouth of the retort prior to the movement of the pusher ram, so that the latter may be brought into accurate alignment with the retort before being set in motion.

The illustration below shows a side and end elevation of one form of the apparatus; also an enlarged section of the pusher ram.

The pusher ram A and the constant-pressure ram B are carried in a cradle or frame C one above the other. The ram B is fitted with two pulleys D and E at its forward end (which is the moving member). A chain F, attached to the fixed member of the ram at G, passes over the pulley D, back over a pulley H on the fixed member of the ram, then forward and over the other pulley E on the forward end, and back and over a pulley J at the rear end of the cradle. It is then attached to a loop K on the outside member of the ram A.

This telescopic pusher ram comprises three telescopic members M, N, O, provided with glands and stuffing-boxes at their rear-ends. The innermost member M is fixed in a pivoted bracket P at the rear end of the cradle; while the outermost member O rests on rollers Q, the front roller resting in the movable guide S, which takes the form of a plate adapted to the floor of the retort, and is operated by a ram T mounted beneath the cradle and controlled by a cock.

The front end of the ram is preferably fitted with a head U, adapted to close or contract laterally should it engage any deposit caked on the retort. This contracting head consists of two overlapping plates each separately connected to the head of the ram by spring arms V of suitable strength.

## APPLICATIONS FOR LETTERS PATENT.

16,872.—Lynde, G. S., "Automatically actuating a valve or valves for mixing air or gases or liquids." Aug. 21.

16,874.—Cowen, H., and Laing, J., "A new method of illuminating by means of a lamp." Aug. 21.

16,877.—Atkinson, T., and Siegenberg, L., "Incandescent gas-burner." Aug. 21.

16,881.—Rayer, C., "Gas-boilers." Aug. 21.

16,912.—Hudson, O. M., "Carburettors." Aug. 21.

16,950.—Joel, H. F., and Stretch, I. M'C., "Supports for gas-mantles." Aug. 22.

16,955.—Shadbolt, R G., "Gas manufacture." Aug. 22.

16,996.—Coney, J., "Silencers for gas-engines." Aug. 22.

17,062.—Baer, M., and Flachshaar, P., "Gas-burner with shutting-off valve." Aug. 23.

17,108.—De Rooij, C. C., "Automatic lighting and extinguishing of gas-lamps." Aug. 23.

17,110.—Dempster and Sons, Ltd., and Mitton, W., "Feeding and measuring coal for charging gas-retorts." Aug. 24.

17,114.—Izzett, J., "Gas-furnaces." Aug. 24.

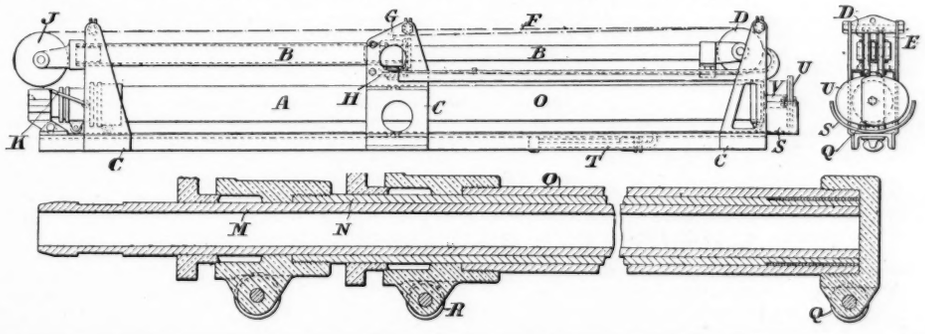
17,130.—Riddell, M., "Starting gas-engines." Aug. 24.

17,231.—Ritchie, J. H., "Incandescent mantles." Aug. 25.

17,254.—Bachner, A., "Incandescent gas-lamp." Aug. 25.

17,260.—Blenheim, W. J., "Indicator for showing, at a distance, the rise and fall of liquids in reservoirs." Aug. 26.

17,267.—Langlands, S. H. B., and O'Connor, H., "Sulphate of ammonia apparatus." Aug. 26.




**Thefts of Water in an Essex Village.**—According to the "Daily Express," dismay is being caused in the straggling old-world village of Pitsea, 26 miles from London on the road to Southend, by the water supply, which is obtained from stand-pipes in the streets, being persistently tampered with—many gallons of water being stolen daily. A few years ago, Pitsea relied for its water supply upon a single well, which used to run dry at frequent periods. By dint of much agitation, the village has now been connected with the main supplying Southend, and four stand-pipes have been erected in the streets. These pipes are fitted with meters, and the parish is charged according to the consumption. For a quarterly rent the inhabitants are supplied with a key to the stand-pipes, and are free to draw water and carry it home. The cause of the trouble which is now agitating the village is that unlicensed people are drawing water free of charge. Cyclists on the road to Southend have discovered that they can turn on the stand-pipes with their spanners. Marauding gipsies, tramps, and others are using bed-keys, pincers, and other contrivances, by means of which they outwit the authorities, and feloniously obtain water. The matter has become so serious that the Billericay Rural District Council have decided to affix notices to the stand-pipes with the view of deterring people from surreptitiously taking the water; and police court proceedings may result.

# MISCELLANEOUS NEWS.

## PROVINCIAL GAS AND WATER COMPANIES.

### Gas.

#### A Large Increase in Consumption at Bath.

In the report presented at the recent half-yearly meeting of the Bath Gas Company, the Directors had the gratification of reporting an increase of upwards of 10 million cubic feet in the quantity of gas sold in the six months ending the 30th of June, compared with the corresponding period of 1904. Though the price was 1d. per 1000 cubic feet less, the revenue was higher. The low price ruling for coke, to which reference was made in the preceding report, continued during the half year; and this materially reduced the income from the sale of residuals. There was some improvement, however, in the market for sulphate of ammonia. The accounts accompanying the report showed receipts amounting to £40,205, and a total expenditure of £31,176. The balance carried to the profit and loss account was £9029; and a sum of £12,422 was available for distribution. The Directors recommended the declaration of the maximum dividend at the rate of 5 per cent. per annum.

#### Increased Sales at Brighton.

The accounts for the six months ending the 30th of June which were presented at the half-yearly general meeting of the Brighton and Hove Gas Company on Friday showed, as compared with those for the corresponding period of 1904, a small increase in the sales of gas, and a reduction in the amount realized from residuals. There were sold for public and private lighting 562,943,500 cubic feet of gas, the revenue from which was £80,542; the rental of meters, stoves, and fittings produced £7052; residuals yielded £15,802; and the total receipts were £103,540. The expenditure on the manufacture of gas was £49,111; on distribution, £17,413; and on management, £4671—the total expenses amounting to £76,826. The balance carried to profit and loss account was £26,714; and the amount available for distribution was £36,533. The Directors recommended the payment of dividends for the half year at the following rates per annum: 6 and 4 per cent. respectively on the "B" and "C" preference consolidated stock, 11¼ per cent. on the original ordinary consolidated stock, and 8¼ per cent. on the "A" ordinary consolidated stock. The payment of these absorbed £24,236, and left £12,297 to be carried forward. Under the supervision of the Company Engineer (Mr. Joseph Cash, M Inst.CE..), 35,298 tons of coal and 552,045 gallons of oil were used in the course of the six months; the estimated quantities of residual products being: Coke, 21,258 tons; breeze, 2049 tons; tar, 406,611 gallons; ammoniacal liquor, 767,230 gallons.

#### Increase of Prepayment Consumers at Hartlepool.

At the annual meeting of the Hartlepool Gas and Water Company last Tuesday, the report presented by the Directors showed the total receipts on revenue account to have been £89,953, and the expenditure £53,451; leaving £36,502 to go to the profit and loss account. From this account there had been paid the interest on loans and the interim dividend; and the Directors recommended that out of the balance of £17,327 the sum of £1500 should be provided for the renewal of worn-out retort-benches, and that a dividend should be paid for the past half year at the rate of 5 per cent. per annum on the whole of the paid-up consolidated capital of the Company, less income-tax. The Chairman (Mr. Appleby), in moving the adoption of the report, congratulated the shareholders on having had another prosperous year, resulting in the maximum dividend being earned and a small balance carried forward. There was a slight decrease in the quantity of gas made, which was no doubt due to the exceptional mildness of the past winter, the depression in trade, and the steady introduction of the system of incandescent lighting, by which not only was the consumption of gas reduced, but its illuminating power very greatly increased. A pleasing feature of the year's work was the increasing number of consumers by the slot-meter system; there being now more than 6000 of these meters in use, which last year yielded a rental of £7612. The market for residuals, especially tar and coke, had been flat, and the revenue from these sources had consequently been reduced. Sulphate of ammonia, on the other hand, had been very firm, and had yielded an increase of upwards of 25 per cent. on the previous year's figures; and, as far as could be judged at present, the conditions were not likely to change much in the immediate future. The first installation of gaseous firing for retorts having been found quite satisfactory, the Directors were extending the system by the renewal of the last of their old retort-benches; and they had appropriated the sum of £1500 out of this year's balance for the purpose—it being intended to charge the whole cost of the work to revenue. Referring to the serious increase in the local rates, the Chairman mentioned that in 1896 the rates paid by the Company amounted to £3605, whereas for the past year they came to £5686—a rise of £2081, representing 57¾ per cent. increase in ten years. The demand for water continued to augment; the quantity sold last year for trade and domestic purposes being 1395 million gallons—an increase of 36½ millions. The phenomenally low rainfall over the Company's gathering-ground during the past two years had so far prevented them utilizing to the full extent the new storage provided at Crookfoot, but the wells and boreholes at West Hartlepool had yielded an abundant supply of pure water. The South Shields and Sunderland Water Company had introduced during last session a Bill asking for additional powers and an extension of their area of supply, which he and his co-Directors considered antagonistic to their interests. Having failed to arrive at a friendly settlement, they lodged a petition against the Bill, which resulted in the most objectionable clauses being deleted. The report was adopted, and the rest of the business disposed of. An extraordinary meeting was then held, and the Directors were empowered to borrow £5000, as authorized by the Company's Act of 1898.

#### Lower Prices and Increased Business at Shrewsbury.

Though the shareholders of the Shrewsbury Gas Company had not the pleasure of the presence of either the Chairman or the Deputy-Chairman at their meeting last Friday, they heard a very good statement as to the progress of the Company from Dr. E. Calvert, who presided. The accounts showed a balance of £8542 carried to the profit and loss account, and a sum of £5930 available for distribution. An interim dividend of 2½ per cent. was paid in March; and the Directors recommended a final dividend of 2¾ per cent. (making 5¼ per cent. for the year), and the addition of £1000 to the reserve fund. There would then be left a balance of £1468. In moving the adoption of the report, the Chairman said that, though a reduction of 2d. per 1000 cubic feet was made in the price of gas on the 30th of June last year, the profit on this year's working was larger than before by £360; thus further emphasizing the Directors' statement as to the results obtained from the new works, and again amply justifying their policy in providing them. He did not intend going in detail into the figures relating to the year's working, but felt he must call their attention to the ever-increasing item of rates and taxes. These now amounted to 2d. per 1000 cubic feet on all gas they sold. No doubt the increasing burden of taxation had been noticed by the proprietors in their individual capacities; and it was a subject that demanded closer attention on the part of the taxpaying community generally. The results shown had enabled the Directors first to propose an additional 5s. per cent. dividend, to which they were entitled under the sliding-scale; secondly, to add £1000 to the reserve fund, which, however, was still a good way from the authorized amount; and, thirdly, with the help of favourable coal contracts, and in spite of a probable reduction in value of some of the residual products, to take a further step in the interest of consumers by reducing the price to the extent of 1d. per 1000 cubic feet of gas, which was equivalent to about £750 on the year. The past twelve months had been of an unusual character as regarded weather—there being practically no winter; but this notwithstanding they had a small increase in consumption—being in this respect more fortunate than many other gas concerns, which had to record a decrease in the same period. The demand for stoves and slot meters had been quite as large as usual; and they had little doubt of having to report a greater increase when they met next year. The report was adopted and the dividend recommended declared. A vote of thanks having been accorded to the Chairman and Directors, Dr. Calvert, in acknowledging it, said the shareholders not only owed a debt of gratitude to the Chairman (Mr. J. Spencer Phillips), but to their Secretary as well, for his efforts were certainly most unwearying on behalf of the Company; and the assistance he lent the Directors, by suggestion and in other ways, was always freely and good-naturedly supplied. Mr. Wade then proposed a vote of thanks to Mr. Belton and the other officers of the Company, and endorsed the observations of the Chairman so far as they related to the valuable services of the Secretary, to which, he said, the prosperity of the undertaking was greatly due. Mr. Belton thanked the meeting on his own behalf, and also on that of the other officers, who, he said, like himself, took a very great interest in the welfare of the Company. They had such experienced and sympathetic Directors that it was a pleasure to work under them. Thanks to the Auditors and to Dr. Calvert for presiding brought the proceedings to a close.

#### Satisfactory Progress at Waltham Abbey.

Though the progress of the Waltham Abbey and Cheshunt Gas Company in the six months ending the 30th of June was not so marked as that recorded in the cases of the two North London Suburban Companies last week, it was reported by the Directors, at the recent half-yearly meeting, to have been of a satisfactory character. Under the supervision of the Engineer and Secretary (Mr. W. Bince Randall), important improvements were carried out at the works (including the erection of a condenser); while new mains were laid in the district, and means adopted to increase the facilities of distribution. The revenue in the half year amounted to £6820, compared with £6666 in the corresponding period of 1904; the expenditure being £4665, against £4579. The balance carried to the profit and loss account was £2155, compared with £2087; and the amount available for distribution was £2935, against £2826. The Directors recommended a dividend on the "A" shares at the rate of 8 per cent. per annum, and on the "B," "C," and "D" shares at the rate of 6 per cent. per annum (less income-tax), after the payment of which there was a balance of £970 to be carried forward. There were manufactured from 2579 tons of coal 30,740,000 cubic feet of gas, of which 28,254,100 cubic feet were sold and 29,195,000 cubic feet accounted for.

#### The Burden of Rates at Watford.

At the half-yearly meeting of the Watford Gas Company on the 24th ult., the report presented by the Directors showed that the profit on the working in the six months ending the 30th of June was £3924, and that the amount available for distribution was £6199. Dividends at the rate of 14¼ per cent. per annum on the "A" stock and 11¼ per cent. per annum on the "B" and "C" stocks (less income-tax) were recommended. The Chairman (Mr. E. J. Slinn), in moving the adoption of the report, remarked that it was the 142nd which had been submitted for adoption; so that the Company had been in existence 71 years. Dealing with the revenue account, he said the Company were feeling the full effect of the reduction made in the price of gas. Notwithstanding this, however, the return from the sale of gas was only about £100 less than it was twelve months ago. The receipts from meters and stoves were £200 more than last year, while the return from the residuals was rather less. On the other hand, it had cost them £700 less for coal; while in distribution the amount expended was not so great. The standard price had been reduced to 2s. 10d., which gave them the opportunity of paying the full statutory dividends. These and interest would absorb £3600. Before sitting down he should like to call attention to the fact that the rates and taxes were about £100 more than they were a year ago; and they now equalled 1½d. per 1000 cubic feet of gas made. The Company had had to fight assessments before now; and they would have to do it again the next time they were touched. It did not do to let these things go by, and hope

that rating surveyors would treat them leniently, because they would not. The report was adopted without discussion. A vote of thanks was accorded to the staff for the indefatigable way in which they had looked after the interests of the Company; and it was acknowledged by the Secretary (Mr. J. Duncan Royal). A similar compliment was paid to the Directors.

### Preparing to Recover Lost Ground at Weymouth.

Though the Weymouth Consumers' Gas Company have been hit by the loss of the public lighting, resulting in the sale of a smaller total quantity of gas in the past half year compared with the first six months of 1904, there was a satisfactory increase in the consumption for private purposes, notwithstanding the competition of the electric light and the prevalence of mild weather in the early months of the year. The supply of gas to cottage property on the prepayment system retains its popularity; and not only were a large number of houses connected during the period covered by the accounts, but orders for fitting up others are being received. The revenue for the six months was £10,165; the expenditure, £7916—leaving £2249 to go to the profit and loss account. The balance on this account was £3778; and the Directors recommended the declaration of a dividend for the half year on the ordinary stock at the rate of 5 per cent. per annum, less income-tax. The Chairman (Mr. J. E. Robens), in moving the adoption of the report, remarked that though for the first time for many years the Directors had to report a deficiency, the shareholders would perhaps not lose sight of the very important reason for it. Last year the increase in the consumption of gas for the first half was 4,210,300 cubic feet; while for the past six months the decrease was 1,605,300 cubic feet. This was not a very large amount when they considered what the Company had had to meet. It amounted in money value to only £265; so that their income had been less by this sum. When they took into account what had occurred in Weymouth during the period he had referred to—the withdrawal of the great bulk of the public lighting and the large increase in the number of the consumers taking the electric light—the shareholders would feel how greatly the undertaking had prospered under the able management of their friend Mr. Colson, who by his energy had brought matters to their present position. Now that they had overcome the difficulties which they had been called upon to face, he thought the time was not far distant when the prosperity of the Company would be even more assured than ever, and the revenue be forthcoming as in former times. At the works everything was in proper order for carrying on an extensive business; and with the excellent Manager they had, to whose energetic efforts he (the Chairman) could bear testimony, and to whom they were largely indebted for the great increase which had taken place in their output, the undertaking would continue to flourish and be a financial success. The report was adopted, and votes of thanks were passed to the Chairman and Directors. The former, in acknowledging the compliment, said he conceived it to be his duty to propose a similar vote to the Engineer and Manager, the Secretary (Mr. E. Y. Wood), and employees, to whom the shareholders were largely indebted for the success of the undertaking. The motion having been carried, Mr. Colson and Mr. Wood briefly responded.

### More Gas with Less Coal at Winchester.

In moving, at the half-yearly meeting last Tuesday, the adoption of the report of the Directors of the Winchester Water and Gas Company for the six months ending the 30th of June, which were noticed in the "JOURNAL" on that day, the Chairman (Mr. J. C. Warner) expressed his pleasure in announcing that the Company had had a distinctly more prosperous half year than had been recorded for some considerable time. They had received from the sale of gas an all-round increase of upwards of £600. For sales to ordinary consumers the increase had been nearly £400, in public lighting about £100, and in prepayment meters about £160 or £170—he was giving the round figures. The meter-rentals had also increased, as they naturally would with the development of what he called the household gas supply through prepayment meters and cookers. Their water-rentals did not show a large increase; but Winchester was not growing so fast as could be wished. The result of the working was an addition to their revenue; and its foundation was that they had made more gas and used less coal. The gas had been manufactured more cheaply; while its quality, he thought, was quite as good as it ever had been, and more money had been received. So that they had gained in their revenue on both sides in the important branch of the manufacture of gas. This increased sale of gas and decrease in the quantity of coal used reflected the greatest credit on the Engineer and General Manager of the Company. Mr. Head had been with them a very short time, but he had brought great energy, considerable skill, and full knowledge of modern methods of gas making; and it was in the retort-house that the profits of gas companies were to be made. He thought it was only fair to Mr. Head and the employees who worked with him to state that it was owing to their exertions and their skill that the Directors were enabled to show the largest increase there had ever been, he believed, in the Company's experience, in the sale of gas for six months. And he might tell them that the sale of gas still continued to expand in as high a degree as it had done during the period under discussion. He did not think it was necessary that he should say much more on the items of the revenue account; the result was that they had carried to profit and loss account £3885. After referring to the new works at Winnall, of which an illustrated description appears elsewhere, and to the high-level reservoir in course of construction on the Romsey Road, the Chairman concluded by formally moving the adoption of the report, and the payment of a dividend at the rate of 4 per cent. on the preference and consolidated ordinary stocks. Mr. W. T. Warren seconded the motion; and it was carried unanimously. The proceedings concluded with a vote of thanks to the Chairman, Directors, and officers, for their services.

### Satisfaction and Congratulation at Wolverhampton.

The Directors of the Wolverhampton Gas Company, in the report presented at the half-yearly meeting last Tuesday, stated that there had been obtained a net profit of £10,262. This, added to the balance brought forward, enabled them to recommend payment of dividends at the same rate as before—3 per cent. upon the preference stock, £5 2s. 6d. per cent. upon the consolidated stock, and £3 2s. 6d. per cent. upon the new ordinary stock, less income-tax—and the addition of the balance of the undivided dividend (£459) to the reserve fund, as authorized by the Company's Act. There would be a balance of £7152 to be carried forward. The reduction in the price of gas for motive power, announced in the previous report, came into operation for the month of March last. The Chairman (Mr. B. O. Clarke), in moving the adoption of the report, said it spoke for itself; and therefore the only thing he had to do was to congratulate the shareholders on the very satisfactory record presented. The report was adopted, the dividends recommended were declared, and the thanks of the meeting were accorded to the Engineer and Manager (Mr. Percy G. Winstanley), the Secretary (Mr. A. Jones), and the staff.

## Water.

### A Treacherous District and High Rates.

At the 105th half-yearly meeting of the South Staffordshire Water Company last Thursday, the Chairman (Mr. Frank James), in moving the adoption of the report and accounts, alluded to the fact that during the six months ending the 30th of June the number of houses laid on was 1754; making the total supplied 126,306, against 1658 during the corresponding period of 1904. The gross amount of water-rates was £64,833, against £62,951. Dealing with the items in the accounts, he said the engine charges were less by £213, though they had pumped considerably more water (more than 500,000 gallons a day), owing to their having made favourable contracts for coal. As to the maintenance of works, the figures showed an increase of £209. He had often described the treacherous state of the district through which the Company supplied water. They had, unfortunately, a burst in perhaps the most unreliable part of their district, which caused very considerable damage to a colliery. They paid into Court a certain amount, which they believed was more than sufficient to cover the damage which had occurred. It was eventually suggested that they should submit the matter to arbitration. They considered the matter, and accepted arbitration. But the Arbitrators could not agree; and an Umpire was chosen. After a considerable time the award was given; and if he said they were astounded at it, it was a very weak term. But he thought if anybody was more astounded than themselves, it was most probably the plaintiffs in the action. The rates—always a stiff item—showed an increase of £322 over the corresponding period of 1904. Once he said that for every pound received in water-rents they paid 2s. for rates. This statement was received with a great deal of surprise outside, and was subjected to some comment by writers in the newspapers, who were astonished to find the Company's rates would come to so much. Since that time the amount had grown, and now it was 2s. 1d. for every pound they received in water-rates, with, he was afraid, no probability of its getting less, for all the demands upon them seemed to be for a higher percentage in the pound than the last one. The current law charges had grown by £379—in relation to the action already alluded to. The result as a whole was that that they had £26,435 as a balance of profit, and they proposed to pay a dividend at the rate of 7 per cent. per annum, amounting to £21,446, carrying forward a sum of £4989; and he hoped this would be regarded as satisfactory by the proprietors. Sir Henry Wiggin, Bart., seconded the motion, and it was carried. The dividend having been declared, a special meeting was held, at which authority was given to the Directors to create £100,000 of new capital by the issue of a further portion of the £300,000 authorized by the Provisional Order of 1901.

## THE PUBLIC LIGHTING OF PRESTON.

### The Proposed Reversion to Gas.

At the Monthly Meeting of the Preston Town Council last Thursday—the MAYOR (Alderman Margerison) in the chair—the recommendation of the Streets and Buildings Committee, referred to in the "JOURNAL" last week (p. 579), that three months' notice should be given to the National Electric Supply Company, Limited, terminating their agreement, dated March 16, 1896, for the supply of electricity to the public lamps, came up for consideration.

Alderman PEARSON, in moving the adoption of the recommendation, said the Council would naturally expect him to give them some information as to what had induced the Committee to take the action they had done. At the present time they had in use for the public lighting 45 electric arc lamps, each supposed to be of 10-ampere, or 1000-candle, power. The cost of the entire 45 lamps for electricity was £825 10s. per annum. The Committee proposed to replace these lamps with 95 double incandescent gas-lamps—45 of the Podmore and 50 of the Bellamy pattern. Two of the Podmore lamps had already been fixed for two years in different parts of the town. They had been under the closest observation, and had given every satisfaction. These lamps were each equal to 400-candle power. The Committee proposed to distribute them through Lancaster Road and the whole of Fishergate now lit by the arc lamps. He might point out that at the present time they had 17 arc electric lamps in Fishergate. They proposed to replace them by 37 double incandescent Podmore lamps; so that a little more than two of these lamps would be fixed where the arc lamps now were, giving a lighting power equal to 800-candles, and certainly enabling the Committee to better distribute the light. The remaining area now lighted by arc lamps would be served by the Bellamy incandescent gas-lamps, which were generally employed by the Liverpool Corporation. The Preston Corporation had had these lamps in use for some time, and they had given the Lighting Committee every satisfaction. The capital cost of the 95 lamps, including the lantern, fittings, burner, and fixing, would be £614 6s. The total cost of gas for them would be £392 10s.; showing an annual saving over that of electricity of £433 per year. It might be considered by

some that the Committee were suggesting a retrograde step. But they must bear in mind that vast improvements had taken place in incandescent gas-lighting of late, and it should be remarked, too, that this kind of lighting lent itself admirably to street illumination. Other authorities and municipalities far wealthier than that of Preston had recognized that in the incandescent gas-light they had a powerful competitor with the electric light. The Corporation of London had recently abolished 47 of their arc lights and substituted 112 incandescent gas-lights; while the London County Council, who generated their own electricity, had decided to revert to gas for the lighting of Waterloo Bridge. Other corporations were moving in the same direction. Marylebone had increased its incandescent lighting by upwards of 5000 lamps, notwithstanding the fact that their purchase of an electricity undertaking had involved them in the expenditure of nearly two millions sterling. Liverpool had often been quoted as being one of the most economically lighted cities in the kingdom; and they had largely adopted incandescent lighting—using the very lamp that the Preston Streets and Buildings Committee suggested should be supplied to the remaining area he had described. He could name other places which had moved in this matter; so that the Council could see that the step the Committee were taking was not so retrograde as had been supposed. It was not only the cost of electricity that had to be considered; there was a very serious difficulty in the distribution of the light of the arc lamps. It was absolutely necessary, if they were to bring them within a reasonable cost, that they should be a certain distance apart. Electric lighting did not lend itself to equal distribution and illumination. Take for instance, Fishergate—the main artery of the town. They had 17 arc lamps in that thoroughfare. About a dozen streets abutted upon it; and difficulty was experienced in lighting up the ends of these streets. Some of them must of necessity be in shadow. It was a positive fact that during the time they had had the electric installation in Fishergate, they had been forced—so many complaints had they had—to put additional lamps at the ends of some of the streets, thereby incurring additional cost. With incandescent gas lighting they were in a position to so distribute the lamps that they could light up the streets that were abutting upon the main artery. They did not propose to ask the Council to make a special grant to meet the capital cost; nor did they ask for any increase of the estimates. They considered that the annual saving would very soon wipe off the balance. In considering this matter, the Committee felt they had some claim upon the Gas Company. A deputation had waited upon the Manager (Mr. Henry Green) and pleaded hard that they should have some consideration in reference to the price of gas. They asked that they should, if possible, have a larger discount. But, after using all the persuasion in their power, they failed to induce the Company to give them anything additional to the 20 per cent. they now received. They obtained 20 per cent. discount, as against 15 per cent. allowed to ordinary consumers. After the discussion, Mr. Green undertook to lay the matter before the Directors; and they had now an offer which the Committee had no hesitation in accepting, because it was, without any conditions whatever, the contribution of a sum of £150 towards the capital cost, which would reduce it to £464 6s. They would therefore see that, with an annual saving of £433, there was no need to ask for a special fund or any increase in the estimates. He assumed that they were obtainining a better, more economical, and a better distributed and steadier light—a light that would satisfy not only the requirements of the Council, but those of the general public.

The Town Clerk (Mr. H. Hamer) at this point read a letter from the Chairman of the Electric Light Company, expressing surprise at seeing the announcement in the local papers of the recommendation of the Streets and Buildings Committee, and disapppointment that, prior to taking this step they did not give the Company an opportunity of making them an offer for a new contract. They thought this would only have been fair and courteous under the circumstances; and they hoped the matter might be deferred to enable them to do so. They pointed out that, under the present arrangement, the lamps and accessories were provided and maintained by the Company, and that if this were done by the Corporation (as was usually the case with gas-lamps), they could reduce their charges to about half the present amount.

Alderman Pearson remarked that, if this letter did anything, it certainly confirmed the action of the Committee.

Mr. Andrew complained that Alderman Pearson had not, as a member of a Sub-Committee of the Tramways Committee who had sanctioned a scheme for the electric lighting of the power station and the destructor buildings, intimated, during the discussion of the matter, that the Streets and Buildings Committee had under consideration a proposal for the substitution of incandescent gas for electric lighting in the buildings and public thoroughfares along which the tramcars ran. He therefore asked Alderman Pearson to defer the matter, so that the two Sub-Committees might confer upon it.

Mr. Dewhurst said he was a member of the Sub-Committees, and assured the Council that the Tramways Engineer and the Chairman of the Committee were approached as to the possibility of supplying electric current for the lighting of the town. Estimates were submitted, and they shelved the whole thing, as the cost was too much.

Mr. Green said the Council had been assured times out of number that this matter of the lighting of the public streets had been under the consideration of the Tramways Committee and adversely reported upon. This was why the Streets Committee brought this proposition before them.

Mr. Oakey proposed that the matter be referred back. Seeing that the Tramways Committee had had the question under consideration, the Council had a right to know at what cost they could light the streets by electricity before they incurred any expenditure with the Gas Company. If they could light them from their own power station, he did not see why they should not do so.

Dr. Derham said an unfair comparison had been made between the most recent incandescent gas-lamp and the old electric arc lamp. On investigation, they would find that, per candle-power, the arc lamp was cheaper than any incandescent gas-light. In the interview with the Directors of the Gas Company, he suggested that the deputation went down on their knees, as it were, to ask for concessions. If this were done to the Gas Company, why not to the Electric Light Company? If they had adopted a similar course in the latter case, they might have secured a reduction in price of the electric light.

Alderman Pearson, in reply, said, with regard to the complaint of Mr. Andrew, he was under the same impression as Mr. Dewhurst—viz., that the consideration of the report submitted by the Tramways Engineer to the Committee was deferred *sine die*. He thought they had no borrowing powers for electric lighting; and supposing they had to decide on a scheme, and seek these powers, his Committee believed it would take considerable time. It had been said the capital cost was lost. Not at all. The pillars and lanterns were there, and they were contracting for 50 to 60 additional lamps every year. These would be used, and they would save 50 per cent. on the lighting. With reference to the letter from the Electric Light Company, he was really surprised. The fact was the Committee had approached them over and over again, and had made innumerable complaints. They never ceased; and they even went to the expense of purchasing an instrument to test the power of the arc lamps. They felt certain they were not getting what they ought to have; and the result of the test was that an average of 400-candle power was shown instead of 1000 candles. In paying an average of £825 10s. for electricity alone for four years, they were not receiving value for their money. Was there anyone who would say that the area covered by electricity was satisfactory? (No, no.) The plant they had was terrible. If it was the wish of the Council that he should withdraw the recommendation, and refer the question to a Joint Committee of the Tramways and Streets and Lighting Committees, with instructions to act, he was perfectly willing to do so. But the facts were plain; and his firm conviction was that the Corporation would never be able to generate electricity at such a cost that they could compete with the improved incandescent lights. Those bodies who generated their own electricity and received their gas from an independent authority went in strongly for incandescent gas-lamps. He submitted that they could not sell a single pennyworth of the current generated, as their supply was limited.

It was agreed that the question should be referred to a joint meeting of the two Sub-Committees, with instructions to deal with the matter at once.

## ORMSKIRK ELECTRIC LIGHT SCHEME.

### The Local Government Board and the Board of Trade and Electric Lighting Agreements.

At the Meeting of the Ormskirk Urban District Council last Tuesday, the members were occupied with a consideration of the position of the Council in regard to their electric light scheme. The question came upon a letter from the Local Government Board stating that they had refused their sanction to a similar scheme at Wisbech; and the point at issue has arisen in other places. It is dealt with in our "Electric Lighting Memoranda" to-day.

The Law Clerk read a letter from the General Manager of the National Electric Construction Company, stating that the Local Government Board and the Board of Trade were at loggerheads over similar agreements elsewhere to that entered into by the Ormskirk Council and the Company in respect of the construction of electricity works at Ormskirk; and they suggested that it would be necessary to apply for power to carry out the agreement. It was stated that it would only be a matter of form and some additional expense, and there would be no difficulty, so far as he had been able to find out, in obtaining these powers. He did not give up hope, having regard to the fact that the Local Government Board had in the past sanctioned so many similar agreements. A further letter from Messrs. Deacon and Co., the Solicitors to the Company, stated that they did not see any use in proceeding with the agreement, having regard to the position which the Local Government Board had recently taken up on the agreements which their clients had with Wisbech in regard to the electric lighting of the town. Their agreement was practically identical with that concluded with Ormskirk; and upon the Wisbech people applying for a loan, the Local Government Board had, after some months of delay, informed them that they could not sanction one. Their view was that the agreement was one requiring the consent of the Board of Trade, under section 11 of the Electric Lighting Act of 1882; and on referring the matter to the Board of Trade, the latter had refused their consent. The Local Government Board had then suggested that the Local Authority should seek further powers enabling them, with the consent of the Board of Trade, to transfer their obligations under the Electric Lighting Order, and the matter could then go through. They (the writers) were satisfied, from a legal point of view, that the agreement with Wisbech and Ormskirk was not one which required any consent from the Board of Trade, under section 11 of the Electric Lighting Act of 1882. Unfortunately, as they knew, there were no means of appealing from the decision of the Local Government Board and the Board of Trade, except, possibly, by bringing a test-action into the Courts, which would, of course, be a matter of some expense.

The copy of the letter received from the Local Goverment Board, in reply to an application by the Town Council of Wisbech for sanction to borrow £25,000 for electric lighting purposes, set forth that the Board had been informed by the Board of Trade that the latter were not prepared to give their consent to the proposed agreement between Wisbech and the National Electric Construction Company. The Local Government Board were therefore unable to entertain the application in its present form. The Board, however, had been informed by the Board of Trade that if Wisbech desired to raise a loan for the purpose of providing electric light, and then to transfer the undertaking to a company, they should seek further powers enabling them, with the consent of, and by deed to be approved by, the Board of Trade, to transfer their powers, the Board would then be prepared to consider an application for their consent to a deed of transfer.

A further letter from Messrs. Deacon and Co. was read, in which

they stated that they gathered that the Local Government Board's objection was that in certain cases—and they thought this applied to Ormskirk—the Provisional Order did not contain any provision for the transfer of the undertaking. Their suggestion, therefore, came to this—that Ormskirk should apply for a further Order, giving them authority to transfer, and also to retain, some of the powers, duties, and liabilities vested in them by the original Order. No doubt the Board of Trade would amplify the statement they had already made on this point, if the Council were to apply direct to them.

In the course of the discussion to which the reading of the correspondence gave rise, Mr. Ellis asked if, when they interviewed the Engineer to the Electric Construction Company, he did not say explicitly that he had had agreements with other local authorities similar to that which they proposed to make with Ormskirk. The Clerk said that was so. The Town Clerk of Carnarvon had informed him that they had obtained the sanction of the Local Government Board to borrow the money. Since then, however, the Board had refused their sanction to such schemes. Mr. Draper said it appeared to him they could not do anything until Wisbech had settled the question. He was quite sure a little delay would be beneficial, especially in Ormskirk. They had better await events. Mr. Ellis agreed with Mr. Draper. The Chairman (Mr. F. A. Jones) said he had given very careful consideration to the matter. He had considered the point raised by the Local Government Board, and he must say that, speaking impartially, he agreed with them that the consent of the Board of Trade was required, and he did not agree with the opinion of the Solicitors to the Electric Construction Company. If that was the correct view to take, it seemed to him that the conditions which were likely to be imposed upon them were of so onerous a nature that the Council would have to seriously consider whether they would not be wise in dropping the scheme. In fact, if these conditions had to be carried out, he had no hesitation in advising the Council that their proper course would be to do so. After some further remarks, the matter was deferred.

## THE FIRST SPIRAL-GUIDED HOLDER IN AUSTRALIA.

A copy of the "Queensland Times" for the 13th of July, just to hand, contains an account of the completion, for the Ipswich Gas Company, of the first spiral-guided holder in Australia. It was supplied by Messrs. R. & J. Dempster, Limited, and was inaugurated two days prior to the above-mentioned date. When the Company was formed in 1878, a holder having a capacity of 25,000 cubic feet was erected; and six years later another, allowing for an additional 17,000 cubic feet, was obtained. The growth of gas consumption necessitated a further increase; and about a year ago the Directors decided, on the advice of the Manager (Mr. W. Scoles), to have one on the spiral-guided principle capable of storing 100,000 cubic feet. The matter was at once put in train; and in March last the ironwork was delivered at Ipswich. Meanwhile, the brick tank (the contract for which was let to Mr. G. Williams for £735) was being prepared. It is 62 feet in diameter and 19 feet deep. The erection of the holder was entrusted to Messrs. Barbat and Co. for £325. The cost of the material delivered at Queensland was £739 2s. 4d.; the entire cost, £1799 2s. 4d. The holder is built of wrought-iron plates, 4 ft. 6 in. by 2 ft. 7 in., and in putting them together 96,600 rivets were used. It was practically ready for testing at the end of the week before its inauguration; and the inflation was perfectly successful. When the holder had attained its full height of 36 feet, there was a space of about 6 inches at the base below the water-line. The operation was witnessed by a numerous company, who, on the invitation of Mr. Scoles, partook of light refreshments in his residence; he and his wife entertaining their guests most hospitably. A toast of "Success to the New Gasholder" having been cordially honoured, "The Health of Mr. and Mrs. Scoles" was received with equal heartiness. Mr. Kilner proposed "The Contractors." In acknowledging it, Messrs. Williams and Barbat said they had got on excellently with the Manager, by whom they had been well looked after while engaged on the contract.

## INCREASED GAS STORAGE AT NEW ORLEANS.

A recent number of the "American Gaslight Journal" contained an account of the test of a new holder which has been erected for the New Orleans Lighting Company, and which will practically double their storage capacity. The holder has the distinction of being the largest in the South; and when completed it will have cost approximately $75,000. Its capacity is 1,018,000 cubic feet, which is equal to that of the other five holders of the Company. The need for the holder is shown by the fact that, according to the General Manager of the Company (Mr. T. D. Miller), a breakdown for a period of eight hours last winter, when the Company were sending out 3 million cubic feet of gas per day, would have left the city in darkness, in so far as it was dependent upon gas for its light. With greatly increased storage room, however, there was no possibility of such a catastrophe. Mr. Miller said that if the city continued to grow as it had done in the past two years, the Company would, in all probability, have to erect another holder of twice the capacity of the one just finished. The contract for the holder was let a year ago last June; and it was to be in a condition for receiving gas by July 4 last. It would have been ready well within the contract time had not an accident occurred to the last load of material in the course of transit by railroad. The holder is 110 feet in diameter and 152 feet high; and it was necessary to use in the foundation 240 piles, driven to the depth of 40 feet. The steel for the structural work and the sections of the holder (four in number) and a large tank for water, were shipped to the city in small plates, and put together on the site. Some idea of the size of the holder can be gained from the fact that more than 6 million rivets hold the parts together. This portion of the work called for special care, on account of the near proximity of the works to the Charity Hospital. In the wards of the hospital there were many people who were seriously ill; and the incessant noise of the pneumatic riveter would have been fatal to some of the sufferers. Consequently, the majority of the rivets were placed in position by the hydraulic riveter, which has a pressure of 40,000 lbs. to the square inch, and makes no noise whatever. The steelwork for the holder was contracted for by Messrs. R. D. Wood and Co., of Philadelphia.

## EXTRAORDINARY GAS EXPLOSION AT PETERBOROUGH.

### Gas Ignited by a Bicycle Lamp.

An extraordinary explosion of gas occurred at Peterborough last Thursday evening, resulting in several persons being rather badly burnt. The Gas Company have been carrying out some extensions of their mains, and on the day named the workmen had completed the junction of some new pipes at a point not far from the entrance to the gas-works. At half-past seven, when they were about to leave off, they had not joined the new and old mains of another section. The old main, however, was plugged, and the other was closed by a valve inserted about 3 feet from its extremity. A crowd of people had gathered round the excavation, and were watching the operations, among them being a young man named Sidney Weston, who stood with his bicycle and lighted lamp just over the spot where the valve was located. While the work was progressing, complaint was made to the foreman (Mr. Wade) by the landlord of an adjacent inn, that he could not light his gas-jets. Mr. Wade thereupon concluded that the main had become filled with air; and he decided to open the valve and release it. He proceeded to do so, when the escaping air and gas ascended from the hole, and, coming in contact with the bicycle lamp, became ignited, and a violent explosion followed. A great sheet of flame enveloped everyone near, and a general rush from the scene ensued. With great presence of mind, Mr. Wade at once closed the valve, but not before he had received some serious burns on the face and right arm. Weston was burnt about the face and hands, and the flame caught the watchman at the back of his neck. The worst sufferer was Mr. Wade's daughter, who was waiting for her father, and whose face was badly burnt. She was taken to the Infirmary; but, after receiving attention, she was able to go home. The other injuries sustained were fortunately not of a very serious nature.

## THE PROPOSED GAS-WORKS FOR WITHNELL.

### Local Government Board Inquiry.

In the "JOURNAL" for the 11th of April last we reported the proceedings at an inquiry held by Mr. H. P. Boulnois, M.Inst.C.E., into an application made by the Withnell Urban District Council for a Provisional Order to enable them to undertake works for the gas supply of the district. On that occasion, Mr. Isaac Carr, the Consulting Engineer for the scheme, explained that the area of supply was to extend to Withnell Fold, Abbey Village, Withnell Mill, and Brinscall. The estimated annual consumption was 7 million cubic feet, and the number of consumers 569, of whom 460 were at Withnell Mill and Brinscall, 50 at Withnell Fold, 48 at Abbey Village. The estimated total outlay was £10,000, of which £1400 was for buildings, £2000 for plant, £2957 for mains, and £2192 for service-pipes, fittings, &c. Subsequently the Council applied to the Board for authority to borrow the above-mentioned amount of £10,000; and the matter was inquired into by Mr. R. H. Bicknell, M.Inst.C.E., one of the Board's Inspectors, last Wednesday. Mr. Carr was in attendance, and submitted the necessary details of the scheme. He said the manufacturing capacity of the proposed works was 10 million cubic feet per annum; and the plant would be capable of extension so as to produce half as much again. The mains would be sufficient to convey from 20 to 25 million cubic feet, and the condensers would be equal to 15 millions; while the gasholder would have a capacity of 35,000 cubic feet, which by telescoping could be doubled. The estimated consumption at the outset was, as stated on the previous occasion, 7 millions. The Inspector asked if they expected this quantity of gas would be consumed per annum with an expenditure of £10,000 and only five miles of mains. It seemed a small area for the expenditure. Mr. Carr explained that the bulk of the houses would be supplied on the penny-in-the-slot system. The amount to be borrowed included the complete fitting of the houses, so that all the consumers would have to do would be to turn on the gas. With regard to the period for the repayment of the loan, the Inspector said he did not think the Local Government Board would allow more than the usual time. Mr. Carr quoted the figures at which gas was supplied through slot-meters in adjacent townships, and said the price (4s. 2d.) per 1000 cubic feet at Withnell would compare very favourably. In reply to the Inspector, he said it was not proposed to make water gas, as he considered the cost would be double that of coal gas. He could sell gas at Widnes at 1s. per 1000 cubic feet; but he did not make any water gas. It is expected that the works will be completed by next spring.

## LIVERPOOL WATER SUPPLY.

### The Present Shortage—Protecting the Sources of Water.

On taking the chair at the fortnightly meeting of the Water Committee of the Liverpool Corporation last Tuesday, Alderman Burgess stated, in reply to a question, that he hoped to be in a position, a few weeks hence, to announce the resumption of the constant supply. He reminded the Committee that the present restriction of supply was much less than had been found necessary on former occasions of shortage; and he again impressed on the public the importance of economy in the use of water. The recent copious rains had had the

effect of slightly increasing the supply at Rivington, but the reservoirs there were still very low. The statistics contained in the report of the Engineer (Mr. Joseph Parry, M.Inst.C.E.) showed that, during the week ending the 19th ult., the total quantity of water supplied was 214,126,000 gallons, against 214,473,000 gallons a year ago; but that during the week ended the 26th ult. there was a notable diminution—199,457,000 gallons against 207,252,000 gallons; the daily average falling from 29 to 28 million gallons. With the view of protecting their water supply from pollution, the Liverpool Corporation have decided to cover, for a distance of 1100 yards, the watercourse connecting their Roddlesworth and Anglezarke reservoirs in the Rivington watershed. This particular stream passes through a populous village at Withnell, and its contiguity to the dwelling-houses has hitherto rendered it liable to be contaminated. A start has been made with the scheme, which is estimated to cost £10,000.

## TYNEMOUTH CORPORATION WATER SUPPLY.

### Visit to the Font Works.

The Mayor of Tynemouth (Alderman Spencer) and the members of the Corporation, accompanied by representatives of several neighbouring Councils, visited the Font Water-Works last Wednesday. The party numbered nearly 200 gentlemen, all of whom were more or less interested in the water undertaking of the Corporation. Since the previous official visit, much progress has been made; and the visitors were consequently able to appreciate the dimensions and the possibilities of the scheme, of which the following are some particulars.

The area of the watershed is 7400 acres, and the average annual rainfall 36 inches. The water area of the reservoir is 87 acres, and its capacity 720 million gallons. The daily compensation water is $1\frac{1}{2}$ million gallons; and the daily supply available for Tynemouth is $3\frac{3}{4}$ millions. For the last seven years, the average daily flow of the river has been 7·6 million gallons. The top water-level is 611 feet above the sea level; and the maximum depth of water is 81 feet. The length of the reservoir is $1\frac{1}{2}$ miles; of the main embankment, 1140 feet; and of the wing embankment, 1500 feet; maximum height of embankment, 94 feet; top width of embankment, 20 feet; bottom width, 600 feet; earthwork in embankments, 425,000 cubic yards; puddle clay in embankments, 26,000 cubic yards; top of embankment, 617 feet above sea-level.

The main embankment, now in course of construction, spans the valley of the Font at a point about 1200 feet from, and almost parallel to, the railway; and, when completed, the top of the embankment will be 32 feet higher than the coping of the railway viaduct. About 500,000 cubic yards of earth are required to form the embankment; and this material is being excavated from a pit at the north end by means of two steam navvies, which are now taking out about 800 cubic yards daily. To make the embankment water-tight, a centre core is made of puddle clay. It is 27 feet thick at the bottom and 6 feet at the top. To prevent filtration of water under the embankment, this core wall is carried down to the impervious rock, the trench being filled with concrete. The trench below the puddle clay centre wall has been founded on solid shale, and is now filled with concrete up to the ground level. The maximum depth has been 105 feet below the surface, and the top width varies from 6 to 27 feet.

The tunnel through which the river flows during the construction of the embankment is lined with cast-iron segmental plates, and has an internal diameter of 15 feet. Its length is 634 feet. On the completion of the embankment, the tunnel will be blocked at the inlet end, and will be utilized for the purpose of carrying the draw-off pipes from the valve-tower to the waste-water pit, from which point the main draw-off pipe is now permanently laid under the invert of the tunnel, and connected up to the distributing-house. A second stop will also be put on the inlet side of the waste pit, and the outlet length will be utilized to carry off the overflow water from the reservoir; and it will then fall down the waste-water shaft. The length of the weir of the overflow channel is 300 feet, and the overflow water thence falls down the shaft into the tunnel. The top diameter of the shaft is 36 feet, decreasing to 15 feet; the total fall of the water being 72 feet.

The valve-tower, situated 80 feet from the inlet end of the tunnel, is octagonal in shape, and lined with cast-iron cylinders 8 feet in diameter. It will stand 20 feet above water level, and contain the valves and gearing for controlling the six draw-off pipes, which are 15 inches in diameter. The distributing-house contains the main draw-off pipe from the reservoir, which discharges into a circular basin, round which are eight pipes, each connected to a filter-bed; and in this house the supply to the beds is regulated. They are five in number (three more to be constructed later), each having an area of 11,000 square feet, and capable of filtering 720,000 gallons daily. The filtering medium consists of 28 inches of sand and 26 inches of gravel of various gauges. The unfiltered water comes from the distributing-house in a 12-inch pipe, discharging over a stone sill on to the top of the sand. The filtered water passes through the gravel into dry brick drains, which convey it to the outlet chambers, situated in the corners, where it flows over a weir into a pipe, which finally discharges into the pure-water tank. The rate of filtration—about 3 million gallons per acre per day—is controlled by the weirs in the outlet chambers. From the tank the filtered water passes through a Venturi meter into the main to Tynemouth; the meter recording the hourly rate of flow, and the total quantity passed.

The gravitation main to Tynemouth is 18 inches in diameter, and has a total length of $24\frac{1}{2}$ miles. Below the tunnel outlet is the compensation basin and gauging weir. The flow of the river is recorded daily by a Hutchinson cam recorder, and on the weir the quantity of the compensation water will be measured and recorded. For the purpose of a temporary supply to Tynemouth, an intake has been made about 1200 feet above the tunnel inlet. From this a temporary pipe-line has been laid to the waste-pit, and there connected up to the main draw-off pipe leading to the distributing-house. By this means water can be delivered into the house.

The contract for the construction of the reservoir was started in October, 1901; but not till May, 1902, were more than 100 men employed. In November, 1903, the Corporation decided to carry out the works themselves; and since that date it has been done under their administration.

After the inspection of the works, the guests and members of the Corporation partook of luncheon in a large marquee. The Mayor of Tynemouth presided, and was supported by Alderman J. Elliot, the Chairman of the Water Committee, Mr. F. R. Hull, the Resident Engineer, for Messrs. James Mansergh and Sons (the Engineers of the scheme), and others. The usual loyal toast having been duly honoured, the Mayor extended a hearty welcome to the guests of the Corporation, and said the primary object of the visit was to show all who were officially interested in the question of water supply for the East Coast of Northumberland the progress they had already made, and to satisfy inquiring minds as to the prospect of the Corporation being able to bring their water scheme to a successful issue. He need not enter into many figures, but he would like to say a few words as to the financial resources which the borough of Tynemouth was able to bring to its assistance when required for water purposes. It had been hinted in times past that the undertaking was far too large for the borough to cope with; but the burgesses themselves never held such views. It might have been said that so large a sum as £400,000 was one which Tynemouth would have some difficulty in meeting; but he would tell them that such was the financial estimation in which the borough was held throughout the country, that for more than twelve months past they had never advertised for money, and yet far more had been pressed upon them by willing lenders than they could possibly take. They were spending at the rate of £2000 a month; and the total amount which they had laid out to date on the undertaking was no less than £416,000. If and when the requirements of the districts they undertook to supply were such as to need a much larger amount, he had no doubt the Corporation would be found able and willing to go again to Parliament to enable them to develop the great work they had already initiated, and so far accomplished. He thought, however, the question of the water supply throughout the kingdom was fast becoming a national one; and therefore it behoved all local authorities to meet when opportunity arose, and interchange ideas for their mutual benefit. This, he hoped, was also one of the objects they had in view that day. Experience had now enabled them to judge of the resources of the watershed in a practical and conclusive manner, and they were in a position to know that there was an ample supply of water for all requirements, and a very large margin for many years to come. The toast of "The Health of the Mayor and Corporation of Tynemouth" having been duly honoured, it was responded to by Alderman Elliot. Before leaving, the visitors were entertained at tea; and the hospitality of their hosts was suitably acknowledged.

## GLOUCESTER CORPORATION WATER SUPPLY.

A short time ago, a meeting of the members in the Western Counties District of the Association of Municipal and County Engineers was held at Gloucester, when the City Surveyor (Mr. R. Read, Assoc.M.Inst. C.E.) read a paper describing the municipal works of the city. In the course of it he gave some particulars as to the water-works.

In his opening remarks, Mr. Read said there could be no doubt that Gloucester owed its existence to the excellent facilities which the River Severn and the watercourses flowing into it afforded for water supply and navigation; while shallow wells sunk in the gravel deposits over the lower lias clay provided an abundant source. As time went on, and these sources became more or less polluted, water was first brought from the outside, from Robinswood Hill, an outlier of the Cotswold, about two miles south-east of the city, in lead pipes; and in the seventeenth century pumps were erected on the banks on the Severn, worked by a water-wheel, forcing the river water through wooden pipes formed of young elm trees bored out and cut at the ends to spigot and socket-joints; the sockets being strengthened with iron bands. In 1855, the Robinswood Hill supply was in the hands of a Company, who had constructed reservoirs there and laid on the water to some of the principal houses by means of cast-iron mains and lead service-pipes; and the demand becoming greater than they could supply, the Corporation, on the advice of the late Mr. J. F. Bateman, in that year obtained an Act of Parliament, purchased the Company's rights for £18,000, and constructed additional water-works at Witcombe, five miles east of the city, on an escarpment of the Cotswold Hills. In 1863 the city was supplied from this source by a 12-inch cast-iron main from two impounding reservoirs, having a total capacity of 80 million gallons. The second or lower reservoir was enlarged in 1870, and a third one constructed; bringing up the total capacity of the three reservoirs to 120 million gallons, which Mr. Bateman advised was the limit of the capacity of the watershed of 1500 acres in a series of dry years.

The author was appointed Surveyor and Water Engineer in March, 1878; and in 1881, in consequence of dry seasons, it became necessary to give an intermittent supply, owing to the great increase in the population taking the water. In 1882, Mr. Bateman was again consulted in reference to an additional source of water; and he recommended tunnelling for half-a-mile into the face of the escarpment of the Cotswold Hills at Witcombe, to bring back water which followed the dip of the strata in a south-easterly direction towards the Thames Valley. This ingenious scheme had to be abandoned after trial borings had been made, owing to legal and other difficulties. In 1883, on the author's recommendation, the Corporation installed the Deacon meter system for the detection of waste of water, at a cost of £2000. This sum included 20 meters, the division of the city into that number of districts, about 100 additional valves in the distributing mains, and 1200 outside stop-taps to service-pipes. The result of the working of the system was that by June, 1884, the consumption of water was reduced from 32 to 16 gallons per head per day, and it was maintained between that and 20 gallons per head per day, on a total population of 55,000, including the outside population supplied.

In 1891, after Mr. Bateman's death, Mr. William Fox, M.Inst.C.E., was consulted; and he, with the author and the late Mr. J. J. Seekings, who was then Mayor, investigated about ten possible schemes for additional water supply, including two from the River Severn and the one finally adopted—viz., the sinking of a well in the new red sandstone near Newent, 11 miles west of the city. Accordingly, in January, 1893, a boring 10 inches in diameter was started at Oxenhall, near Newent, and an abundant supply was found, which overflowed the surface. The boring was continued by the Corporation to 290 feet; but the landowners, thinking to find coal, arranged with the Contractors to continue the boring to a depth of 1200 feet. As at this depth the bottom of the Bunter beds of the new red sandstone had not been reached, the boring was discontinued. The Corporation deposited plans and applied for an Act of Parliament in November, 1903; the only opposition to the scheme being with the view of obtaining clauses in reference to wells in the neighbourhood, and to the crossing of the River Severn by the 14-inch main carrying the water to Gloucester. The well, which cost £4586, was commenced in October, 1894, and sunk 170 feet into the new red sandstone—15 feet in diameter for the first 60 feet, and 12 feet in diameter for the next 90 feet. At a depth of 145 feet headings were driven—one being in a northerly and the other in a westerly direction. These largely increased the supply to the well; and the Contractors had to pump 1½ million gallons of water per day to enable the men to work. The northern heading was 117 feet in length, the western one 145 feet.

While the well was being sunk, a 14-inch main was being laid and the covered service reservoir constructed. The reservoir was at Upleadon, three miles from the pumping-station, 159 feet above the top of the well, and 250 feet above Ordnance datum, and contained 600,000 gallons. In 1901, a second reservoir, holding 1¼ million gallons, was added, from the author's designs, in concrete. The water was delivered to Gloucester on July 1, 1896. It was raised from the well into tanks under the engine-house floor by lift pumps 14¾ inches in diameter and 4 ft. 6 in. stroke; and double acting force-pumps drew from the tanks and forced the water up to the reservoir at Upleadon, whence it gravitated eight miles to Gloucester. The engines, pumps, and boilers, which were capable of raising 30,000 gallons of water per hour, cost £5415. The pumping-station, built in red brick and forest stone dressings, consisting of engine-house (60 feet by 30 feet), boiler-house, workshop, &c., cost £3766. The cost of the scheme was £45,000.

In 1901, considerable trouble was experienced at the Witcombe reservoirs owing to the growth of water plants. These weeds grew at the bottom of the reservoirs wherever light penetrated, and at a very rapid rate, especially during the summer months, when the temperature was more than 60° Fahr. At certain stages of their growth they imparted a fishy taste to the water; and though this was in no way injurious to health, it was very unpleasant, especially when the water was heated. In order to overcome this difficulty, the author installed, in October, 1901, a battery of ten of Bell Bros.' mechanical filters, at a cost of £5000, or about one-fourth of the total which would have been necessary to establish ordinary sand filters at the reservoirs, which would have necessitated a loss of 50 feet of head in the main going to the city. The Bell filters, being continuous in action, only created a loss of 2 lbs. pressure between the inlet and the outlet of the filter. They consisted of steel drums, each containing about 7 tons of Leighton Buzzard sand, through which the water was passed. The filters were washed out three times a week by reversing the flow of the water to each cylinder in succession. They could be used with or without chemicals; but from 0·1 to 1 grain of sulphate of alumina per gallon greatly facilitated the filtration; the result being that the water was sent to the city clear, bright, and in perfect condition. These filters had been at work for 3½ years, and had made the Witcombe water potable during the hot months, when in the old times it had frequently to be shut off.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

This week the gas accounts of the Corporation of Aberdeen have been issued. They show an output of gas amounting to 666,330,000 cubic feet—an increase of 17,251,000 cubic feet over the preceding year. Of this quantity, 635,207,000 cubic feet were sold, making the unaccounted-for gas 31,093,000 cubic feet, or equal to 4·89 per cent. The quantity of coal carbonized was 67,793 tons, making a yield of gas of 9900 cubic feet per ton. There was a revenue from gas of £89,877, from coke of £10,331, and from tar and ammoniacal liquor of £9779. There was derived from house-services £1778, and from gas-stoves, £541. The total revenue amounted to £112,434, or a decrease of £6089. The drawings from gas were £4097 less, which was due to the reduction in price a year ago by 2d. per 1000 cubic feet. From residual products the revenue (£20,110) was £979 less, that from house-services was £1023 less, and from gas-stoves £45 more. The total expenditure amounted to £92,698—a decrease of £2055—leaving to profit and loss account £19,736, or £4034 less than a year ago. Of the expenditure, £52,473 was paid for coal, which amount was a reduction of £1609; and purifying materials cost £1571, or £518 less. Salaries and wages amounted to £14,634, and the maintenance of works and plant to £5064, making the total expenditure on the manufacture of gas £74,389. Distribution (including wages of meter inspectors, repairing and refixing meters, repairs and maintenance of mains and services, and laying, paving, and labour) amounted to £3865, as compared with £3198 the previous year; house-services cost £1546, compared with £2247; and gas-stoves (written off as depreciation) cost £541, compared with £496. Rents, rates, and taxes amounted to £6169, compared with £5400; management cost £1914, compared with £1824; and discounts and bad debts amounted to £3567, compared with £3638—the bad debts amounting to £313. The capital expenditure during the


# CARBURETTED WATER-GAS APPARATUS

**Merrifield—Westcott—Pearson Patents.**

## The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

**London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.**
**American Offices: TORONTO.** TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

**The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—**

| | Cub. Ft. Daily. | | Cub. Ft. Daily. | | Cub. Ft. Daily |
|---|---|---|---|---|---|
| BLACKBURN | 1,250,000 | ST. CATHERINES (Remodelled) | 250,000 | TONBRIDGE | 300,000 |
| WINDSOR ST. WORKS, BIRMINGHAM | 2,000,000 | KINGSTON, PA. | 125,000 | STRETFORD | 500,000 |
| SALTLEY WORKS, BIRMINGHAM | 2,000,000 | PETERBOROUGH, ONT. | 250,000 | OLDBURY | 300,000 |
| COLCHESTER | 300,000 | WILKESBARRE, PA. | 750,000 | TODMORDEN | 500,000 |
| BIRKENHEAD | 2,250,000 | ST. CATHERINES (2nd Cont.) | 250,000 | SALTLEY, BIRMINGHAM (Third Contract) | 2,000,000 |
| SWINDON (New Swindon Gas Co.) | 120,000 | BUFFALO, N.Y. | 2,000,000 | YORK (Second Contract) | 750,000 |
| SALTLEY, BIRMINGHAM (Second Contract) | 2,000,000 | WINNIPEG, MAN. | 500,000 | ROCHESTER (Second Contract) | 500,000 |
| WINDSOR ST., BIRMINGHAM (Second Contract) | 2,000,000 | COLCHESTER (Second Contract) | 300,000 | NEWPORT (MON.) | 250,000 |
| HALIFAX | 1,000,000 | YORK | 750,000 | TOKIO, JAPAN | 1,000,000 |
| TORONTO | 250,000 | ROCHESTER | 500,000 | PERNAMBUCO (Brazil) | 125,000 |
| OTTAWA | 250,000 | KINGSTON, ONT. | 300,000 | MALTON | 150,000 |
| LINDSAY (Remodelled) | 125,000 | CRYSTAL PALACE DISTRICT | 2,000,000 | DULUTH, MINN. (2nd Cont.) | 300,000 |
| MONTREAL | 500,000 | DULUTH, MINN. | 300,000 | BROCKVILLE (ONT.) | 250,000 |
| TORONTO (Second Contract Remodelled) | 2,000,000 | CATERHAM | 150,000 | SMETHWICK | 500,000 |
| BELLEVILLE | 250,000 | LEICESTER | 2,000,000 | GRAVESEND | 300,000 |
| OTTAWA (Second Contract) | 250,000 | ENSCHEDE (HOLLAND) | 150,000 | NEWPORT MON. (Second Contract) | 250,000 |
| BRANTFORD (Remodelled) | 200,000 | BUENOS AYRES (RIVER PLATE CO.) | 700,000 | TORONTO (Third Contract) | 750,000 |
| | | BURNLEY | 1,500,000 | TORONTO (Fourth Contract) | 1,000,000 |
| | | KINGSTON-ON-THAMES | 1,750,000 | MONTREAL, ONT. (2nd Cont. | 1,800,000 |
| | | ACCRINGTON | 500,000 | HAMILTON, ONT. | 400,000 |

**LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.**

**AND, IN ADDITION, 8,150,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.**

year came to £7534, which raised the capital account to £334,906. The Gas and Electricity Committee met on Wednesday, and resolved to recommend that the price of gas to ordinary consumers be reduced from 2s. 10d. to 2s. 9d. per 1000 cubic feet; that the price of gas used for motive power should be also reduced, the sum fixed being 2s. 6d. per 1000 cubic feet; and that the price of gas consumed through prepayment meters be retained at the present figure of 23 cubic feet for 1d., which works out at 3s. 7½d. per 1000 feet. They estimated a revenue for the current year of £116,134, of which £7858 is the net surplus carried over from the past year, and an expenditure of £113,155, which would leave a surplus of £2979.

In the Electricity Department, which is managed by the same Committee, the output during the past year was 4,899,050 units, of which 451,426 units (equal to 9·21 per cent.) were unaccounted for. The revenue amounted to £39,047, and the expenditure to £17,037, leaving a balance of £22,010. After meeting statutory charges, however, the balance left is reduced to £2753, which is to be carried to the reserve fund, raising it to £16,165. For the current year the revenue is estimated at £37,418, and the expenditure at £37,324, leaving an expected surplus of £94.

I have not hitherto had time to look into the excellent appendix to the accounts of the Edinburgh and Leith Gas Commission, which is issued annually by Mr. J. S. Gibb, the Treasurer. The first item worthy of note in the document is that relating to the cost of purifying. Out of a total charge of £2480, there was expended upon wages £1775, upon lime £689, and upon oxide of iron only £16. Further on, it is found that bad debts, in a revenue of £309,723, amounted to the small sum of £500, which testifies to the efficiency of the collection. The outlay upon coal was £108,158, which was at the rate of 11s. 10·30d. per ton of coal carbonized, 1s. 1·18d. per 1000 feet of gas made, 1s. 2·00d. per 1000 feet sold, and in the proportion of 0·82d. in respect of gas unaccounted for. Wages amounted to £22,376, which was at the rate of 2s. 5·44d. per ton of coal carbonized, 2·73d. per 1000 feet of gas made, and 2·90d. per 1000 feet sold. The total cost of the manufacture was £159,671, which was at the rate of 17s. 6·09d. per ton of coal carbonized, 1s. 7·46d. per 1000 feet of gas made, 1s. 8·67d. per 1000 feet sold, and in the proportion of 1·21d. for gas unaccounted for. Distribution cost £25,824, which was at the rate of 2s. 9·98d. per ton of coal carbonized, 3·15d. per 1000 feet of gas made, 3·34d. per 1000 feet sold, and a proportion of 0·19d. in respect of gas unaccounted for. Management cost £10,059, which was at the rate of 1s. 1·24d. per ton of coal carbonized, 1·23d. per 1000 feet of gas made, and 1·23d. per 1000 feet sold. Feu-duties, rates, and taxes were £13,484, which was at the rate of 1s. 5·74d. per ton of coal carbonized, 1·64d. per 1000 feet of gas made, and 1·75d. per 1000 feet sold. The gross cost of gas was £217,990, which was at the rate of 23s. 10·82d. per ton of coal carbonized, 2s. 2·56d. per 1000 feet of gas made, and 2s. 4·22d. per 1000 feet sold. There was received from the sale of gas £255,024, which was at the rate of 27s. 11·55d. per ton of coal carbonized, 2s. 7·08d. per 1000 feet of gas made, 2s. 9·01d. per 1000 feet sold, and in the proportion of 1·93d. to the gas unaccounted for. For coke there was received £19,504, which was at the rate of 2s. 1·66d. per ton of coal carbonized, 2·37d. per 1000 feet of gas made, and 2·52d. per 1000 feet sold. For tar there was received £13,614, which was at the rate of 1s. 5·92d. per ton of coal carbonized, 1·66d. per 1000 feet of gas made, and 1·76d. per 1000 feet sold. For sulphate of ammonia there was received £20,985, which was at the rate of 2s. 3·61d. per ton of coal carbonized, 2·56d. per 1000 feet of gas made, and 2·72d. per 1000 feet sold. The net cost of gas amounted to £163,291, which was at the rate of 17s. 10·85d. per ton of coal carbonized, 1s. 7·90d. per 1000 feet of gas made, and 1s. 9·14d. per 1000 feet sold. The gross profit amounted to £91,733, which was at the rate of 10s. 0·70d. per ton of coal carbonized, 11·18d. per 1000 feet of gas made, and 11·87d. per 1000 feet sold. Contributions to sinking and reserve funds amounted to £16,593, which was at the rate of 1s. 10·31d. per ton of coal carbonized, 2·06d. per 1000 feet of gas made, and 2·19d. per 1000 feet sold. Annuities cost £35,200, which was at the rate of 3s. 10·31d. per ton of coal carbonized, 4·29d. per 1000 feet of gas made, and 4·56d. per 1000 feet sold. Interest amounted to £34,046, which was at the rate of 3s. 8·80d. per ton of coal carbonized, 4·15d. per 1000 feet of gas made, and 4·41d. per 1000 feet sold. The yield of gas per ton of coal and oil equivalent was 10,798 cubic feet, gas sold was equal to 10,051 cubic feet, and gas unaccounted for was equal to 5·88 per cent. on the make.

When I wrote last week of the affairs of the Nairn Gas Company, I was unaware of the almost complete renovation of the works which is being effected by the new Manager, Mr. J. Barber, formerly of Greenock. When Mr. Barber took up the duties of Manager, in October last, he found that the works were altogether inadequate for the supply of gas to the town in a satisfactory manner, and further that the plant was not only insufficient in size, but was mostly well worn out. When he has finished the alterations that are in hand, which is expected to be about the middle of October, there will be little left of the works as he found them except the retort-house and a couple of gas-holders of small dimensions. There is a make of gas of about 13 million cubic feet a year. The maximum daily make is over 62,000 cubic feet, and the capacity of the old holders is 27,000 cubic feet. To supply the gas required there are ten retorts, with a modern system of firing, which certainly would not leave a sufficient working margin in any ordinary place; but it was possible to make them serve because of the fact that, owing to the large influx of visitors in summer, and the closing up of many houses in the winter, the make of gas is almost as large at the present time as it is in the depth of winter. The somewhat uncomfortable situation has existed that the holders get filled in the course of the forenoon, and gas making has then to cease until the load comes on in the evening, when it has to be resumed in more than earnest; but, despite the efforts of the staff, the holders cannot be kept up, and sometimes before relief is obtained the available supply is down to the third rivet of the last holder. Such was the uncomfortable working condition Mr. Barber had to face when he went to Nairn. He soon convinced the Directors that such a


# INCLINED RETORTS.

PATENT "DWARF" INCLINED BENCH.

12 YEARS' Experience in actual building of Benches.

16 YEARS' in Manufacture of Conveyors and Elevators for same.

33 CONTRACTS COMPLETED.

Also Designers of every kind of Transport Appliance for Gas-Works.

*SPECIALITIES:*

ARCHD. LITTLE'S
PATENT
Measure Chamber,
Coke Carrier,
Coke Conveyor,
Coal Conveyor,
Inclined Retorts,
AND
W. T. HOLLAND'S
Grit-Proof Bearings.

No Gas-Works is complete unless the above are in use.

Write for Estimates.

NEW CONVEYOR Co. LTD., SMETHWICK.

state of matters was unsatisfactory and unprofitable; and it is to their credit that they have allowed him to have his way to the full. The retort-bench is to stand in the meantime, because along with the rebuilding of it there has to be faced the erection of a coal-store, and this, again, depends upon the reconstruction of some of the buildings. For the new works a range of shops and dwelling-houses adjoining were acquired and gutted; and after some slight structural alterations, these have been adapted for the accommodation of the purifiers, the exhauster, and the office. The provision of the new plant has been entrusted to Messrs. Henry Balfour and Co., Limited, of Leven, Fife. A set of four annular condensers, of ample capacity, has been erected to take the place of a set of 5-inch tubular condensers. A diminutive tower scrubber has been replaced by a Livesey washer and a Creek patent annular brush scrubber. For the first time an exhauster has been introduced into the works; the apparatus being one by Messrs. Bryan Donkin and Clench, Limited. The purifying plant consists of four houses 10 feet square, which take the place of two houses 8 feet square. A new telescopic holder, of 95,000 cubic feet capacity, is in course of erection. The works stand on a gravelly bank by the side of the River Nairn, which made it impossible to go farther down than 3 feet with the foundation of the holder. It has accordingly been placed in a steel tank, which rests upon a concrete bed. This arrangement gives the holder the appearance of great height for the width of it; but it is not anticipated that in working there will be any difficulty with the wind. A new governor, by Messrs. Bruce Peebles and Co., Limited, has been fitted up, and it and the purifiers are already in operation. The work has been very expeditiously executed, having only been begun on June 1 last. Mr. Barber designed the whole of it, and has superintended the erection throughout. The cost of the alterations in progress will be about £4000. When they are completed, and a new retort-bench is erected, the works will be practically new ones standing upon the old site, and will be about as complete as any of their size in the country; and the well-directed exertions of Mr. Barber will then, it is to be hoped, be crowned with the success they deserve.

A new water supply for the burgh of Lossiemouth was turned on last Wednesday; the ceremony being performed by Mrs. Peterkin, wife of the Provost of the burgh. For a long time, owing to the flatness of the surrounding country, it was thought to be impossible to obtain a supply of water by gravitation; and for years water was carted, and was sold to the inhabitants at ½d. per bucket. In 1877, a steam-engine was employed to pump the water, and this method of supply has existed to the present time. The supply that has been introduced is spring water, which is derived from heights at some distance from the town, known as Blackhills. The new supply is capable of furnishing 50 gallons of water per day to a population of 5000. The immediate occasion of the new scheme is the rising importance of the place as a health resort and a golfing centre. Messrs. George Gordon and Co., of Elgin, were the Engineers for the scheme; and Mr. James Ross, of Elgin, was the Contractor.

## CURRENT SALES OF GAS PRODUCTS.

**Week ending Sept. 2.**

The London market remains steady; but there has not been much business doing. There is no alteration to report in prices of tar products. Sulphate of ammonia is very firm; and makers maintain their quotations on the basis of £12 12s. 6d., Beckton terms, for prompt.

**Sulphate of Ammonia.** LIVERPOOL, *Sept.* 2.

The week opened with a very firm market, and in some cases advanced prices were paid for August shipment. Since then, urgent orders having been covered, there has been a quieter tone; and the closing prices are £12 5s. per ton, f.o.b. Hull, and £2 10s. per ton f.o.b. Liverpool and Leith. For delivery over near months a premium of 2s. 6d. per ton is generally asked; but buyers do not seem keen about paying this advance. For delivery further ahead, makers quote £12 15s. to £12 12s. 6d. per ton, according to position, but no business at these prices has transpired.

**Nitrate of Soda.**

This article, though quiet, is firm at 10s. 3d. and 10s. 9d. per cwt. for ordinary and refined qualities respectively, on spot; and 10s. 3d. per cwt. continues to be quoted for ordinary quality for spring delivery.

**Tar Products.** LONDON, *Sept.* 2.

Markets have been fairly steady during the past week, and as a rule prices have been well maintained. Carbolic acid has been very quiet, but crude is decidedly a little firmer at the close. Business was reported early in the week at 1s. 7⅜d.; but towards the end 1s. 8d. was paid at an outport for prompt delivery, while offers of 1s. 8⅛d. for September-December are reported to have been declined by makers. There are, however, sellers at 1s. 9d. over this period, although there is a general disposition to wait a little before selling forward to any considerable extent. There has been certainly more business doing in crystals at about 6⅛d. for 39-40 per cent., at which price German makers are reported to have placed a considerable quantity. So far as anthracene is concerned, there is no business of any importance to report. In benzol the demand continues fairly good; and so far as London is concerned, the inquiry is very strong. Sales are reported in 90 per cent. at the equivalent of 10d. for September shipment; but 9⅜d. was accepted by makers in the North for October-December delivery In 50-90 per cent. there are sellers at 9¼d. f.o.b.; but consumer decline to pay this price, although it is reported that a large business has been arranged for home consumption over the last four months of the year. There is really nothing offering in toluol, but there are anxious buyers for prompt delivery; while just at

THE
MAXIM PATENT CARBURETTOR
FOR ENRICHING GAS IN BULK.
PREVENTS NAPHTHALENE DEPOSITS.
OVER 120 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.
Among the Companies and Towns supplied are The Gaslight and Coke Company, Manchester Exeter, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Ten Years.
MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.
THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.
The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.
Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.
For Prices and full Particulars, apply to
THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

present most of the manufacturers appear to be fairly well sold up to the end of the present year. So far as London is concerned the price for creosote is well maintained for the best qualities; but in the Lancashire district there is not very much business doing, and there appears to be a considerable quantity offering. In Yorkshire, sales are reported at 1 5/16d. for September-October delivery, but the largest makers as a rule ask 1⅜d. The position in pitch is practically unchanged. The South Wales consumers are still open to purchase for forward delivery, but Continental consumers appear fairly indifferent as to the market. London makers are still firm in their ideas, and do not appear at all anxious to sell; while as regards the Yorkshire manufacturers, they appear disposed to wait until later in the year before selling forward, owing to the uncertainty which prevails as regards the price of tar.

The average values during the week were: Tar, 16s. to 21s. Pitch, London, 28s. 6d. to 29s.; east coast, 28s. to 28s. 6d.; west coast, 25s. 6d. to 26s. 6d. Benzol, 90 per cent., 9¾d. to 10d.; 50-90 per cent., 9¼d. to 9½d. Toluol, 9d. Crude naphtha, 3¼d. to 3½d.; solvent naphtha, 9d. to 9¼d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1 5/16d. to 1 11/16d.; North, 1¼d. to 1⅜d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 1s. 8d. Refined naphthalene, £4 to £8; salts, 13s. to 15s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

**Sulphate of Ammonia.**

The market has been very steady during the past week, and closes with a firm tone. Beckton's price still remains £12 12s. 6d.; and they are reported to have refused business at £12 10s. in any position. The South Metropolitan Company still quote £12 15s. on their own special terms, at which price, however, business does not result. In Leith, sales are reported at £12 10s.; and some of the makers ask £12 12s. 6d. for prompt, and are not at all anxious to sell for forward delivery. The market continues decidedly firm in Liverpool, but there is no business of importance to advise. There is little, if any, business doing at Hull, and prices are purely nominal at about £12 7s. 6d. to £12 8s. 9d.

**Gas Manager Checks Serious Conflagration.**—Owing to the foolhardy act of a youth who struck a match and ignited some petroleum which had escaped from a barrel on Wexford Quay last Thursday, an explosion occurred, followed by a serious conflagration. During the excitement someone indiscreetly turned on a jet of water with the view of extinguishing the flame. This, of course, had the effect of simply increasing the blazing area, and of adding to the dense volumes of smoke which filled the atmosphere in the locality. Fortunately, Mr. John Lyne, the Manager of the gas-works, came upon the scene, and by his directions large quantities of coal dust were procured from some of the neighbouring stores. This was poured in thick layers upon the blazing thoroughfare, and in a few minutes the flames were completely subdued, and the outbreak gradually flickered out.

## COAL TRADE REPORTS.

**Lancashire Coal Trade.**

Coal miners, no less than colliery proprietors, are hoping that trade and weather conditions will soon better their position. It seems remarkable that, with the undoubtedly large general consumption of coal which is regularly going on, the demand should be so vrry easily supplied. The fact, however, is that the coal mining industry is so vast, and the number of persons employed in it so great, that the demand must become abnormal before prices are materially affected or sufficiently inflated to warrant an increase in wages. This is well known to those engaged in the coal trade. At the annual meeting of the shareholders of Messrs. Bolckow, Vaughan, and Co., Limited, at Manchester a few days ago, the Chairman stated that the coal trade had been in an unsatisfactory condition, and prices had receded, showing a fall of 3·40d. per ton. Last year the reduction was 7·12d. per ton. Locally, the holiday season is not over. The stoppage of a great town's mills, like Oldham, has a very marked effect on coal consumption. There is not much coal from Lancashire shipped for export, except by the Ship Canal; but from Hull for the week ending the 29th ult., the amount exported was 41,517 tons, compared with 36,455 tons for the corresponding period last year. Local prices show no change from last week. It is regrettable to find that there are more idle miners at the present time than has been the case for many years. Wages are very low. Owing to "difficult" places in mines and other causes, the Lancashire and Cheshire Miners' Federation have paid to members out of employment this year between £20,000 and £30,000.

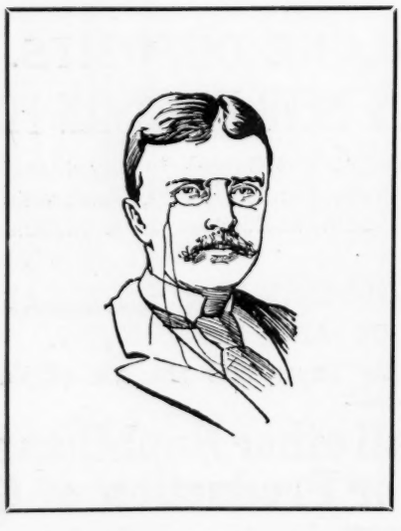
**Northern Coal Trade.**

There is some improvement in the coal trade of the North, partly due to general causes, and in part to the increase in the consumption as the nights lengthen. In the steam coal trade, there is a rather fuller export; and there is some expectation that the newer conditions of Russia may enable it to take more coal before the close of the Baltic season than it might have done. Best Northumbrian steams are from 9s. 3d. to 9s. 4½d. per ton f.o.b., second-class steams are from 8s. 3d. to 8s. 6d., and steam smalls are from 4s. 10d. to 5s. 6d. In the gas coal trade, the demand is now enlarged, and the output of the collieries is better taken up. Prices generally vary for Durham gas coals from 7s. 9d. to 8s. 3d. per ton f.c.b., according to quality; but one or two of the best known kinds are rather higher, and some of the collieries are now endeavouring to obtain better prices than those named for contracts for next year's shipment. In the coke trade, prices are firm; but for gas coke they are very irregular, and in some cases lower, though it is believed that the stocks of gas coke abroad are now very much reduced. It is difficult to quote prices, but perhaps 11s. to 11s. 6d. f.o.b. may represent medium prices.

**Scotch Coal Trade.**

There is again an apparent drawback in trade, which may be the reflex of the lessened clearance for shipping, due to storm and fog at


# Two Peacemakers!



PRESIDENT ROOSEVELT.

RICHMOND'S COOKER.

ADVERTISEMENT OF THE RICHMOND GAS STOVE & METER CO., LTD. LONDON: 132, QUEEN VICTORIA STREET, E.C. WORKS & OFFICES: WARRINGTON & STRATFORD.

sea. So far as can be seen, trade otherwise is well maintained; the outputs from the collieries moving off freely. Prices remain unchanged. The quotations are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow, ell 8s. to 9s., and splint 8s. 6d. to 8s. 9d. The shipments for the week amounted to 243,752 tons—a decrease of 48,061 tons upon the preceding week, and of 19,337 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,849,379 tons—an increase of 460,998 tons upon the same period of 1904.

**A New Industry in Gas-Works.**—The manufacture of tarred roofing felt has been started on a commercial scale at the works of the Boise City (Idaho) Gas Company. A building for the machinery used in the tarring process has been erected and equipped at an expenditure of approximately $5000. In it the latest design of machinery has been installed; and it is estimated that the plant is capable of turning out something like 15,000 square feet of tarred felt daily.

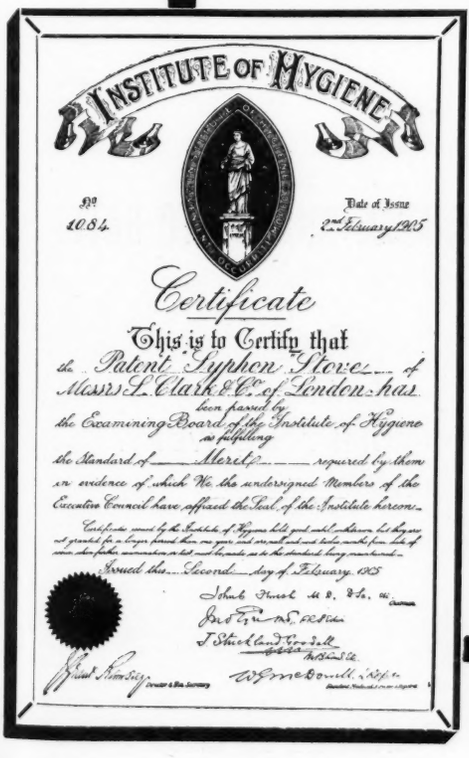
**Extension of the Hereford Water-Works.**—Last Wednesday an inquiry was held by Colonel A. G. Durnford, R.E., on behalf of the Local Government Board into an application made by the Hereford Corporation for sanction to a loan of £2343, for the purpose of providing new pumping plant and carrying out extensions of the mains. The Town Clerk (Mr. J. Carless) said the water-works were established in 1854 under an Act of Parliament, and supplied practically the whole of the inhabitants of the city. The original outlay was £35,000; and the total amount expended on the works up to the present time was £47,752. The sum still owing was only £11,500. The chief object of the application was the borrowing of £1100 for the purpose of supplying a supplementary plant in case of breakdowns, and erecting the requisite buildings. The remainder of the amount was made up by the cost of extending the mains. He asked that the repayment of the loans should be spread over a long period. The City Surveyor (Mr. J. Parker) gave the items of expenditure showing how the £1100 was made up.

**Complaint of Vibration Caused by a Gas-Engine.**—In the Vacation Court last Wednesday, Mr. Justice Lawrance had before him a motion, in the case of *Saunders v. Lovell*, for an injunction to restrain the defendant from working a gas-engine and certain machinery in a shed adjoining No. 2, Oakley Road, South Norwood, so as to be a nuisance to the plaintift and his tenant, and also to the tenants of the two other adjoining houses, also owned by the plaintiff. One of the tenants had sworn that the vibration of the engine caused her crockery to "dance." The machinery had run on Sundays, and worked till eleven at night; so that the tenants had no peace. Defendant's Counsel denied this, and said the engine was a "baby" one, and could not make the noise alleged. He contended that there was no vibration to the extent complained of. Eventually his Lordship ordered the motion to stand over till the trial of the action. Measures were to be taken to expedite the hearing of the case; the defendant to give an undertaking not to run the engine so as to be a nuisance to the plaintiff's tenants.

**Dissatisfied Slot Consumers at Portsmouth.**—There is no satisfying some people. Working men gas consumers at Portsmouth are adversely criticizing the Portsea Island Gas Company for making those who have automatic meters pay 3s. 4d. per 1000 cubic feet, as compared with 2s. 4d. paid by the ordinary consumers. It is the opinion of correspondents who have written to the papers on the matter that a reduction to the overcharged consumers would be far preferable than the increased amount given in coke (£100 from £60) for distribution among the poor during the winter season.

**Manchester Corporation and the Chorlton-cum-Hardy Gas Supply.**—At the monthly meeting of the Manchester City Council tomorrow, the following resolutions of the Gas Committee will be submitted: (1) "That it be recommended to the City Council to empower the Gas Committee to offer the sum of £50,000 to the Stretford Gas Company for the purchase by the Manchester Corporation of the Company's existing and prospective rights, powers, and privileges for supplying with gas the district of Chorlton-cum-Hardy, now within the City of Manchester; such sum of £50,000 to include the purchase of meters, gas-stoves, main-pipes and service-pipes, &c., belonging to the Company already fixed and laid in the district; and further that the Corporation agrees to reimburse the Stretford Gas Company any expenses to which the Company may be put in reference to obtaining powers by Act of Parliament or otherwise to carry into effect the transfer of the said rights, powers, and privileges." (2) "That, inasmuch as the contingent fund of this department, according to the balance-sheet at March 31 last, amounted to £145,994, the City Council be further recommended to authorize the payment of the purchase-money of the foregoing transaction out of such fund."

**Shrewsbury Water Supply.**—At the quarterly meeting of the Shrewsbury Town Council on Monday last week, the Water Committee presented a report on the present conduit water supply. The Chairman of the Committee (Alderman Meeson Morris) said the report was of much importance, because at present it was absolutely impossible to store water at the conduit head; and in order to maintain a supply to the higher parts of the town, they were compelled to resort to what seemed to him a very antiquated device—viz., to pump water by means of a gas-engine into a small reservoir which was much too low-lying, and consequently the engine had to be kept running from early morning until late at night. A peculiar state of affairs, however, was that practically half the water pumped overflowed, and went back to the wells. This method naturally caused considerable expense in pumping; and the Committee, therefore, thought the time had arrived when, without having any bearing on the future scheme of supply for the town, something should be done. They intended to put a new reservoir, capable of holding 30,000 gallons, or a two days' supply, in a more elevated position, and pump the water into it, and so save the overflow into the wells. The probable cost of the improvement was, according to the Borough Surveyor (Mr. W. C. Eddowes), likely to be about £1200. After some discussion, the report was agreed to.



INSTITUTE OF HYGIENE

No 1084 Date of Issue 2nd February 1905

Certificate

This is to Certify that the Patent Syphon Stove of Messrs L. Clark & Co. of London has been passed by the Examining Board of the Institute of Hygiene as fulfilling the Standard of —— Merit —— required by them in evidence of which We the undersigned Members of the Executive Council have affixed the Seal of the Institute hereon.

Certificates issued by the Institute of Hygiene hold good and unbroken for the year or granted for a longer period than one year until cancelled and holder notified from time to time otherwise in writing by the Institute as to the standard being maintained.

Issued this Second day of February 1905

John Hunt M.D. D.Sc. &c. Chairman

J. Shirley Dowdall Registrar

W. Jones Bonwill, Dep. Sec.

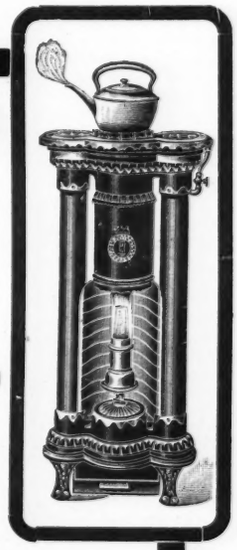
THE PERFECTION OF HYGIENIC HEATING

RECOMMENDED BY ALL THE HIGHEST AUTHORITIES ON HYGIENE.

CLARK'S PATENT HYGIENIC

"SYPHON"

STOVES.



See our Exhibit at the

NEWCASTLE GAS EXHIBITION,

Sept. 13th to 28th.

SEND CARD FOR CATALOGUE AND FULL PARTICULARS.

S. CLARK & CO., Patentees and Makers, Compton Works, Canonbury Road, Highbury, London, N. Show-rooms: 58, Holborn Viaduct, E.C.
Telegrams: "Syphon Stoves, London." Telephone: 1777 North.

**Sale of the Somersham Gas-Works.**—Last Thursday, the Gas-Works at Somersham, St. Ives (Hunts), were sold by auction for £350. There are some 40 consumers in a population of about 1400; and the annual sale of gas is 400,000 cubic feet, at 6s. 8d. per 1000 feet.

**Successful Artesian Boring.**—A remarkably fine spring of water has just been obtained for the Bourne Rural District Council by boring at Thurlby, South Lincolnshire. It was struck at a depth of 117 feet from the surface, and yields about 170,000 gallons a day. The pressure is so great that the water rises 25 feet into the air.

**The Pontefract Corporation and the Gas-Works.**—At the recent half-yearly meeting of the Pontefract Gas Company, the Chairman (Mr. Joseph Taylor), alluding to the proposed purchase of the undertaking by the Corporation, said the Directors had secured the services of two experts, whose report had been received; and as soon as the Directors had considered its terms they would call the shareholders together.

**Bread Baking by Gas.**—A correspondent having written to the "Halifax Courier" to ask whether any of the readers of that paper considered bread which had been baked in a gas-heated oven injurious to health, the question was submitted to Dr. Neech, the Medical Officer of Health for the borough. He said he had no hesitation in answering in the negative. "Possibly," he remarked, "bread baked in a brick oven will be sweeter; but so far as injury goes, there can be nothing of that sort from a gas-oven."

**The Explosion at Cape Town.**—It appears the explosion which occurred in Adderley Street, Cape Town, on the 14th of June last, as reported in the "JOURNAL" at the time, was due to an accumulation of coal gas and water gas in a sewer, and that the mixture was ignited by the fires which were being used in the welding operations in progress at the time in connection with the tram-lines. The Commission who investigated the matter state that the electric cables had nothing whatever to do with the accident.

**Large Gas-Engine and Producer Plant.**—We learn from the "Engineering Supplement" to "The Times" that at the new works of Argyll Motors, Limited, at Alexandria, Messrs. A. Rodger and Co., of Govan, are constructing ten Rodger-Rowden gas-engines, three of which are for direct driving and seven coupled direct to dynamos for electric lighting and power purposes. This gas-engine plant is capable of furnishing 1500 brake horse power, and is therefore a remarkable installation of producer-gas plant.

**Projected Gas Exhibition in Newcastle-on-Tyne.**—On Wednesday, the 13th inst., there will be opened, at the Exhibition Hall, St. Mary's Place, Newcastle-on-Tyne, a gas exhibition on an unprecedented scale in the district. It is being promoted by the Newcastle Exhibitions, Limited, under the auspices of the Newcastle and Gateshead Gas Company, and it will be open for two weeks. There will be a fine show of appliances for the utilization of gas for lighting, heating, and motive power. The arrangements are in the hands of Mr. J. Lewis (of the Gas Company) and Mr. W. A. Cowie.

**Batley Corporation Gas Accounts.**—The annual abstract of accounts of the Batley Corporation has just been issued. A perusal of the gas-works accounts reveals the fact that during the year ending March 31 last a gross profit of £10,197 was made. Interest and sinking fund, however, brought this down to £3462. As £5000 had been appropriated from the gas funds in aid of the rates, the difference had to be taken from the accumulated fund, which now stands at £7046. In 1904 the net profit was £3850; so that though the price of gas has been reduced 2d. per 1000 cubic feet, and meter-rents are less by one-half, the profit for the past year is only about £400 less than in the previous twelve months. This is regarded as very satisfactory. The total consumption of gas was 183 million cubic feet, against close upon 174½ million cubic feet the previous year.

**The Recent Electricity Breakdown in Bradford.**—At a meeting of the Electricity Committee of the Bradford City Council held on Friday, the Electrical Engineer (Mr. A. S. Blackman) presented a report in reference to the interruption of the supply of electricity on the 9th ult. It was due to the fusing of two of the main cables near the works. The general supply to the town was discontinued at 6.5 p.m. and reinstated at 9.50 p.m., through temporary connections. The damage has since been made good; the cost of the work being £322. Evidence of the cause of the initial mishap was destroyed in the process of the burn-out; but the effect was to raise the potential of the armouring upon some of the adjacent cables, which produced arcs at points where the armouring of neighbouring cables was in contact. The cause, with the possible exception of the initial short-circuit, was due to the unbonded joints upon the mains, as, had the armouring been rendered continuous and earthed, it would have remained at earth potential.

**Suicide by Inhaling Coal Gas.**—At the Chelsea Town Hall on Monday last week, Mr. S. Ingleby Oddie held an inquiry with reference to the death of Harry Baker (53), who committed suicide under strange circumstances at Onslow Dwellings, Fulham Road. The widow stated that her late husband was for nine years a clerk at the Board of Education at a salary of 30s. a week, but, owing to getting into trouble through drinking to excess, he had to leave his situation six months ago. Afterwards he got work at Thorneycroft's for a short time, and since then he had done a little rough work on the roads for the Richmond Corporation. He had often threatened, and on one occasion attempted, suicide. On the previous Thursday he went out, and returning with three newspapers and a bottle of gum, went to his bedroom, with the request that he should not be disturbed. He also put some coppers into the gas-meter. At midnight she called to him, but the door was locked; and he shouted to her to go away from the door. Next day the door was forced, and he was found dead on the bed. The gas-jet was turned on fully. There was a piece of rubber tubing on the table underneath, and he had used the newspapers and gum to cover up the fireplace, windows, and all the cracks of the doors. There was a strong smell of gas in the room. She added that since the deceased had been out of work he had done nothing but worry. The Coroner referred to a number of letters and documents found in Baker's possession, which showed that he had been gradually going down hill. After hearing other evidence, the Jury returned a verdict of "Suicide by coal-gas poisoning while temporarily insane."

The "MAIN"

Gas

Cooker

RELIABLE AND UP-TO-DATE.

PROMPT DELIVERY.

R. & A. MAIN, LIMITED,

LONDON, GLASGOW, FALKIRK, BRISTOL, MANCHESTER,

BIRMINGHAM, AND BELFAST.

**Todmorden Gas Managership.**—At the meeting of the Todmorden Town Council last Wednesday, the acceptance by the Gas Committee of the resignation of Mr. Henry Hawkins, the Engineer and Manager, was confirmed.

**Finances of the Southport Water Board.**—There is a decrease in the sums required this year from Southport and Birkdale to make up the deficiency in the accounts of the Southport, Birkdale, and West Lancashire Water Board. Last year the amounts were £8113 and £2005 respectively; but it appears that those needed this year are £5004 and £1313. As far as Southport is concerned, it was calculated in the estimates that £6000, entailing a 4d. rate, would be required; but the present precept to be levied will mean a rate of only 3½d. in the pound.

**Explosion at South Shields Gas-Works.**—An explosion of rather an alarming character occurred on Sunday afternoon at the South Shields Gas-Works, but fortunately it was unattended by any serious consequences. It seems that the explosion occurred in a hydraulic main in one of the retort-houses off Oyston Street, and an iron top was blown off, which came in contact with the large gasholder in Waterloo Vale, and made some holes in it. Steps were, of course, promptly taken to make good the damage, and restore the plant to its usual condition.

**Supply of Cookers, Grillers, &c., in Belfast.**—A special meeting of the Gas Committee of the Belfast Corporation was held last Tuesday, for the purpose of settling the tenders for cookers, grillers, and heating-stoves. After consideration, the Committee, subject to the approval of the Council, accepted the two lowest tenders for cookers and grillers—those of John Wright and Eagle Range, Limited, and the Richmond Gas Stove and Meter Company, Limited. They also accepted the tenders of Messrs. Wilsons and Mathiesons, Limited, and John Wright and Eagle Range, Limited, for heating-stoves; these likewise being the lowest.

**Electric Light Failures.**—The series of promenade concerts which commenced at the Queen's Hall, Langham Place, on the 19th ult. were marked by an unpleasant incident the following Monday night, when a failure of the electric light for about twenty minutes caused some commotion among the audience, but happily no panic or accident. Last Wednesday week, the supply of electricity failed at Maidstone, with the result that all the tramcars were brought to a standstill. About half-past eight o'clock on Saturday, the 26th ult., shopkeepers and residents in Rochdale who depend upon the Corporation electricity works for the lighting of their houses and premises were startled to find them suddenly plunged in darkness, owing to the failure of the main fuses on the dynamo supplying the lighting mains. The sections affected were out of connection for periods ranging from 10 to 90 minutes. Those consumers who had gas quickly brought it into use; but others, including some large shopkeepers, had to put up with the scant illumination afforded by candles.

**Graham, Morton, Limited.**—A Company under this title has lately been registered with a capital of £125,000, in £1 shares (85,000 being 7 per cent. cumulative preference shares), to acquire the business of Messrs. Graham, Morton, and Co., Limited (incorporated in 1898), now being conducted at the Pepper Road Works, Hunslet, Leeds, and elsewhere, and to carry on the business of mechanical, gas, electric, mining, and general engineers, contractors, machine and engineering tool makers, boiler makers, iron, steel, and brass founders, millwrights, metal workers, brick makers, metallurgists, retort-setters, furnace builders, &c. The signatories are: M. Graham, J. Morton, H. Morton, Mrs. N. E. Graham, Mrs. L. C. C. Morton, Miss G. E. Edwards, and W. Spyer. There will be no initial public issue. The number of Directors is to be not less than three nor more than seven. The first are Messrs. M. Graham, J. Morton, and E. Gray (of Gray's Court, York). The two first-named may each retain office while holding one-sixth of the ordinary shares issued for the time being.

**Bradford Corporation and the Gas Supply of Wilsden.**—The residents of Wilsden have recently made strong complaints against the charges for gas made by the Bradford Corporation. Though Wilsden is included in the area of the Bingley Urban District Council, it receives its gas supply from the works of the Bradford Corporation at Clayton; the price charged being 2s. 9d. per 1000 cubic feet, with 5 per cent. discount, whereas the price of gas at Bingley is 2s. 5d., with 15 per cent. discount. The Bingley Council have been approached by Wilsden, who ask that as they possess the right of supply of gas to Wilsden, they should purchase Wilsden's portion of the Bradford Corporation gas undertaking at Clayton. Last Friday, therefore, a deputation from Bingley attended a meeting of the Corporation Gas Committee, and explained the position of affairs, at the same time inquiring what would be the price of the portion of the gas-works referred to. The deputation having withdrawn, a price was fixed; and the Town Clerk was instructed to forward particulars to the Bingley Council.

---

The conditions of manufacture of the Grantham Crank and Iron Company, Limited, having materially changed in recent years—boiler construction being now a speciality—the name has been changed to the "Grantham Boiler and Crank Company, Limited."

The East Sussex Gaslight, Coke, and Water Company, Limited, has been registered with a capital of £25,000 in £5 shares (2500 being 6 per cent. preference) to adopt an agreement with the Gas and Water Works Supplies and Construction Company, Limited, and to carry on, in the United Kingdom or elsewhere, the business of a gas and water works company in all its branches, and that of engineers, contractors, &c. The minimum cash subscription is 200 shares.

The "Hardwareman" predicts that the feature of the coming winter's trade will be the inverted incandescent burner. "This new member of the incandescent family will," it is said, "give a decided impetus to the incandescent industry. Hitherto the electric light has had a strong pull over gas by reason of the pleasingly artistic and variously ornamental methods of its installation; but now that the inverted gas-burner has arrived, the rivals are equally matched, and the fight for supremacy will be keener than ever."

THE

PARKINSON

"CROWN"

COOKER

SHOWING HOT-PLATE

HINGED TO FACILITATE

CLEANING OF BURNERS, &c.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

The Newark Gas Company have placed an order with Messrs. Robert Dempster and Sons, of Elland, for a tower scrubber.

We have received from Messrs. Falk, Stadelmann, and Co., Limited, their new incandescent gas-light catalogue (No. 229), containing revised prices of Jena glass, "Veritas" mantles, burners, globes, fancy shades, &c. These articles are shown in great variety.

The Pulsometer Company, Limited, have at the Naval Exhibition, Earl's Court, a stand (No. V., Imperial Court) on which they are showing their various well-known types of pumps for every service—steam, belt, or motor driven; also their water purification plants to deal with any quantity of the dirtiest and hardest of waters.

We have received from Messrs. Edgar Allen and Co., Limited, of Sheffield, an illustrated catalogue of the various kinds of machinery manufactured by them. It shows the different types of crushers, grinders, separators, elevators, conveyors, screens, storage hoppers, &c., on which they are constantly employed; and it will be found a useful addition to a gas engineer's library.

In the course of an article on "The Eclipse of the Oil-Lamp" in the current issue, the "Ironmonger" says: "There will always be a demand for oil-lamps, of course, for the export trade, and for those home districts where there is no gas or electric current, or where these illuminants are too expensive for common use. But there can be very little doubt that the oil-lamp is being ousted from the dining and drawing rooms of the middle and upper classes, and to nearly the same extent from the houses of the artizan section of the population. It is being ousted by electric light partly, but chiefly by gas—by the beauty and efficiency of the incandescent system, in its various forms, in the one case, and by the simplicity, convenience, and economy of the penny-in-the-slot system in the other. The wheel of fortune may come round again, bringing prosperity to the oil-lamp trade; but there is no sign of any such change at the moment, and he is indeed a sanguine man who expects any."

Messrs. S. Sherman and Son, of the West Central Lantern Works, New Compton Street, W.C., send one of their illustrated catalogues and price lists of lanterns and accessories. The firm have been supplying lanterns to the trade for upwards of half-a-century; and the catalogue they are issuing embodies the results of their latest efforts at improvement. The designs shown can be adapted for ordinary gas, oil, or electric light.

Readers of the "JOURNAL" are familiar with the reproduction of the title-page of the pamphlet "A Study in Automatics" which the Cannon Iron Foundries, Limited, are issuing. It is an artistically printed *brochure*, showing how the "automatic" principle of supply may be profitably extended to gas. On the last page is a collection of articles of domestic utility in which this clean and useful fuel can be employed. The Company are also sending out a catalogue of their wet and dry prepayment and ordinary meters. The meters shown are prefaced by a few remarks on the prepayment system of gas supply, and on the advantages claimed for the "Cannon" meter.

The Bourne Gas and Coke Company, registered last month, is a reincorporation under the Companies Act, 1862, as an unlimited Company, of a concern of the same name originally constituted by deed dated May 21, 1840, made between various persons named therein. This deed provided for the raising of capital not exceeding £2000 in shares of £10 each, except with the sanction of the members, with which sanction additional capital might be raised by calling on existing members to the maximum extent of £5 for every original share. Any capital still further required might be raised by the issue of new shares or by mortgage of the Company's property; no member being liable, save as already specified, to advance money beyond the amount of the shares held by him. The members, however, are made liable for bearing all losses *pro ratâ* to their holdings. The deed also provides that no member may hold more than 10 shares. No statement of the nominal and issued capital had been filed at the time of the conversion.

## WANTED, FOR SALE, CONTRACT, &c. ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

### Situations Vacant.

NIGHT FOREMAN (ABROAD). No. 4458.
FITTINGS ASSISTANT (ABROAD). No. 4458
CLERK. No. 4459.
DRAUGHTSMAN. No. 4456.

### Situations Wanted.

ASSISTANT ENGINEER OR MANAGER. No. 4451.
SMITH (GENERAL). J. W., West Croydon.

### Gas Plant Wanted.

NEW OR SECOND-HAND. No. 4460.

### Plant, &c., for Sale.

LAMPS.
STATION METER. No. 4448.
SULPHATE OF AMMONIA PLANT, &c. No. 4457.

### Company Meeting.

OTTOMAN GAS COMPANY. London Offices. Sept. 12. One o'clock.

### Tank Waggons on Hire.

CLAYTON ANILINE COMPANY.

### Stocks and Shares.

SHEPPY GAS COMPANY. Sept. 16.

### TENDERS FOR

### Coal.

NEWTOWNARDS URBAN DISTRICT COUNCIL. Tenders by Sept. 28.

### Coke.

RAMSGATE GAS DEPARTMENT. Tenders by Sept. 9.

### Lead and Compo. Pipe and Tin.

RHONDDA GAS AND WATER DEPARTMENT. Tenders by Sept. 14.

### Meters.

GLASGOW GAS DEPARTMENT. Tenders by Sept. 11.

### Pipes and Fittings.

RHONDDA GAS AND WATER DEPARTMENT. Tenders by Sept. 14.

### Saturator.

WARRINGTON GAS DEPARTMENT. Tenders by Sept. 14.

### Tar and Liquor.

HAVERFORDWEST GAS DEPARTMENT. Tenders by Sept. 16.

## GAS COMPANIES' STOCK AND SHARE LIST.

**Referred to on p. 613.**

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 590,000 | 10 | Apl. 13 | 10½ | Alliance & Dublin 10 p.c. | 21½–22½ | .. | 4 13 4 |
| 160,000 | 10 | ,, | 7½ | Do. 7 p.c. | 14½–15½ | .. | 4 16 9 |
| 200,000 | 5 | May 12 | 6½ | Bombay, Ltd. . . . | 6½–7 | .. | 4 12 10 |
| 140,000 | 5 | ,, | 6½ | Do. New, £4 paid | 5–5½ | .. | 4 14 6 |
| 50,000 | 10 | Aug. 31 | 14 | Bourne- } 10 p.c. . . | 29–30* | .. | 4 13 4 |
| 251,810 | 10 | ,, | 7 | mouth Gas } B 7 p.c. . | 16½–17½* | .. | 4 0 0 |
| 53,200 | 10 | ,, | 6 | and Water } Pref. 6 p.c. | 15½–16½* | .. | 3 12 9 |
| 380,000 | Stk. | Aug. 16 | 12½ | Brentford Consolidated | 250–255 | +3 | 4 18 1 |
| 300,000 | ,, | ,, | 9½ | Do. New . . . | 190–195 | +3 | 4 17 5 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 125–130 | .. | 3 16 11 |
| 206,250 | ,, | June 15 | 4 | Do. 4 p.c. Deb. . | 103–106 | .. | 3 15 6 |
| 220,000 | Stk. | Mch. 15 | 11¼† | Brighton & Hove Orig. | 225–230 | .. | 5 0 0 |
| 246,320 | ,, | ,, | 8¼† | Do. A. Ord. Stk. . | 165–170 | .. | 4 17 1 |
| 460,000 | 20 | Mch. 30 | 10 | British . . . . . | 42–43 | .. | 4 13 0 |
| 100,000 | Stk. | Aug. 16 | 6 | Bromley, Ord. 5 p.c. . | 119–123 | +2 | 4 17 7 |
| 165,700 | ,, | ,, | 4½ | Do. do. 3½ p.c. . | 89–93 | +1 | 4 16 9 |
| 500,000 | 10 | May 12 | 7 | Buenos Ayres (New) Ltd. | 12½–12⅝ | +½ | 5 9 10 |
| 250,000 | Stk. | June 29 | 4 | Do. 4 p.c. Deb. . | 96–98 | .. | 4 1 8 |
| 150,000 | 20 | July 13 | 8½ | Cagliari, Ltd. . . . . | 24–26 | .. | 6 6 11 |
| 100,000 | 10 | May 31 | 10 | Cape Town & Dis., Ltd. | 17–17½ | .. | 5 14 3 |
| 100,000 | 10 | Apl. 28 | 4½ | Do. 4½ p.c Pref. . | 10–10⅜ | .. | 4 5 9 |
| 50,000 | 50 | May 2 | 6 | Do. 6 p.c. 1st Mort. | 52–54 | .. | 5 11 1 |
| 50,000 | Stk. | June 29 | 4½ | Do. 4½ p.c. Deb. Stk. | 101–103 | .. | 4 7 5 |
| 1,400,000 | Stk. | Aug. 31 | 5⅝ | Commercial 4 p.c Stk. . | 116–119* | .. | 4 7 6 |
| 560,000 | ,, | ,, | 5 | Do. 3½ p.c. do. . | 111–114* | .. | 4 7 9 |
| 450,000 | ,, | June 15 | 3 | Do. 3 p.c. Deb. Stk. | 87–89 | .. | 3 7 5 |
| 800,000 | Stk. | ,, | 6 | Continental Union, Ltd. | 114–117 | +5 | 5 2 7 |
| 200,000 | ,, | ,, | 7 | Do. 7 p c Pref. | 137–142 | .. | 4 18 7 |
| 424,070 | Stk. | — | 5¼ | Derby Con. Stk. . . . | 124–126 | .. | 4 7 4 |
| 55,000 | ,, | June 3 | 4 | Do. Deb. Stk. . . | 108–110 | .. | 3 12 9 |
| 486,090 | 10 | July 28 | 11 | European, Ltd. . . . | 22–23 | .. | 4 15 8 |
| 354,060 | 10 | ,, | 11 | Do. £7 10s. paid | 14½–15½ | .. | 5 6 5 |
| 15,223,235 | Stk. | Aug. 16 | 4⅛ | Gas- } 4 p.c. Ord. . . | 100–101 | +⅛ | 4 7 1 |
| 2,600,000 | ,, | ,, | 3⅛ | light } 3⅛ p.c. max. . | 92–94 | +1 | 3 14 6 |
| 3,799,735 | ,, | ,, | 4 | and } 4 p.c. Con. Pref. | 109–111 | .. | 3 12 1 |
| 4,193 975 | ,, | June 15 | 3 | Coke } 3 p.c. Con. Deb. | 88–90 | .. | 3 6 8 |
| 258,740 | Stk. | Mch. 15 | 5 | Hastings & St. L. 3½ p.c. | 100–103 | .. | 4 17 1 |
| 70,000 | 10 | Apl. 28 | 11 | Hongkong & China, Ltd. | 18½–19½ | .. | 5 12 10 |
| 3,800,000 | Stk. | May 12 | 10 | Imperial Continental . | 215–217 | +3 | 4 12 2 |
| 473,600 | Stk. | Aug. 16 | 3½ | Do. 3½ p.c. Deb. Red. | 96–98 | +2 | 3 11 5 |
| 175,242 | Stk. | Aug. 31 | 6 | Lea Bridge Ord. 5 p.c. . | 125–130* | .. | 4 12 4 |
| 561,000 | Stk. | Aug. 16 | 10 | Liverpool United A . . | 222–224 | .. | 4 9 3 |
| 718,100 | ,, | ,, | 7 | Do. do. B . . | 166–167 | .. | 4 3 10 |

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 306,083 | Stk. | June 29 | 4 | L'rpool Unit'd Deb. Stk. | 111–113 | .. | 3 10 10 |
| 75,000 | 5 | ,, | 5 | Malta & Medn., Ltd. . | 4¼–4⅜ | +¼ | 5 5 3 |
| 560,000 | 100 | Apl. 1 | 5 | Met. of } 5 p.c. Deb.. | 102–104 | .. | 4 16 2 |
| 250,000 | 100 | ,, | 4½ | Melbourne } 4½ p.c. Deb. | 102–104 | .. | 4 6 7 |
| 541,920 | 20 | May 31 | 3½ | Monte Video, Ltd. . . | 11½–12½ | +½ | 5 12 11 |
| 1,565,892 | Stk. | July 29 | 4½ | Newc'tle & G'tesh'd Con. | 106–107 | .. | 4 6 5 |
| 406,025 | Stk. | June 29 | 3½ | Do. 3½ p.c. Deb. | 96–100 | .. | 3 10 0 |
| 15,000 | 10 | Aug. 31 | 10 | North Middlesex 10 p.c. | 183–193* | .. | 5 2 7 |
| 52,940 | 10 | ,, | 7 | Do. 7 p.c. | 13–14 | .. | 5 0 0 |
| 300,000 | Stk. | May 12 | 8 | Oriental, Ltd. . . . | 145–148 | .. | 5 8 1 |
| 600,000 | 5 | Mch. 30 | 7 | Ottoman, Ltd. . . . | 6–6½ | .. | 5 12 0 |
| 168,255 | Stk. | — | 6½ | Plym'th & St'house 5 p.c. | — | .. | — |
| 398,490 | 5 | Apl. 28 | 6 | Primitiva Ord. . . . | 6½–6⅝ | +⅛ | 4 8 11 |
| 796,980 | 5 | July 28 | 5 | Do. 5 p.c. Pref. . | 5⅛–5¼ | +⅛ | 4 6 11 |
| 488,900 | 100 | June 1 | 4 | Do. 4 p.c. Deb. . | 97–99 | .. | 4 0 10 |
| 851,070 | 10 | Apl. 28 | 7 | River Plate Ord. . . . | 12⅞–13⅛ | +⅛ | 5 5 8 |
| 300,000 | Stk. | June 29 | 4 | Do. 4 p.c. Deb. . | 96–98 | .. | 4 1 8 |
| 250,000 | 10 | Apl. 13 | 7 | San Paulo, Ltd. . . . | 13–13⅛ | +⅛ | 5 3 8 |
| 70,000 | 50 | July 1 | 5 | Do. 5 p.c. Deb. . | 51–53 | .. | 4 14 4 |
| 135,000 | Stk. | Mar. 15 | 10 | Sheffield A . . . . . | 238–240 | .. | 4 3 4 |
| 209,984 | ,, | ,, | 10 | Do. B . . . . . | 238–240 | .. | 4 3 4 |
| 523,498 | ,, | ,, | 10 | Do. C . . . . . | 238–240 | .. | 4 3 4 |
| 126,106 | Stk. | Mch. 30 | 5¼† | Shrewsbury Ord. 5 p.c. | 107–110 | .. | 4 15 5 |
| 70,000 | 10 | May 31 | 10 | South African . . . . . | 16–17 | .. | 5 17 8 |
| 6,250,000 | Stk. | Aug. 16 | 5⅛ | South Met., 4 p.c. Ord. | 132–134 | +1 | 4 2 1 |
| 1,895,445 | ,, | July 13 | 3 | Do. 3 p.c. Deb. | 88–90 | .. | 3 6 8 |
| 575,000 | Stk. | Aug. 16 | 5⅛ | S'th Suburb'n Ord. 5 p.c. | 122–125 | +2 | 4 8 0 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . . | 125–130 | +3 | 4 4 7 |
| 112,533 | ,, | July 13 | 5 | Do. 5 p.c. Deb. Stk. | 130–135 | .. | 3 14 1 |
| 502,310 | Stk. | May 12 | 5 | Southampton Ord. . . | 111–114 | +2 | 4 7 9 |
| 87,950 | ,, | — | 4 | Do. 4 p.c. Deb. | — | .. | — |
| 120,000 | Stk. | Aug. 31 | 6½ | Tottenham } A 5 p.c. . | 122–125* | .. | 5 0 0 |
| 363,020 | ,, | ,, | 4½ | and } B 3½ p.c. . | 96–99* | .. | 4 16 0 |
| 125,000 | ,, | June 29 | 4 | Edmonton } 4 p.c. Deb. | 105–108 | .. | 3 14 1 |
| 182,380 | 10 | June 15 | 8 | Tuscan, Ltd. . . . . | 9⅜–10 | .. | 8 0 0 |
| 149,900 | 10 | July 1 | 5 | Do. 5 p.c. Deb. Red. | 100–102 | .. | 4 18 0 |
| 30,000 | Stk. | Aug. 16 | 7½ | Wands- } A 5 p.c. . . | — | .. | — |
| 255,636 | ,, | ,, | 6½ | worth } B 3½ p.c. . . | 137–140 | .. | 4 9 3 |
| 60,000 | ,, | ,, | 5⅛ | and } C 3½ p.c. . . | 113–116 | .. | 4 13 6 |
| 57,564 | ,, | June 29 | 3 | Putney } 3 p.c. Deb. Stk. | 82–85 | .. | 3 10 7 |
| 745,872 | ,, | Aug. 16 | 5 | West Ham 5 p.c. Ord. . | 103–105 | +2 | 4 15 3 |
| 185,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . . | 122–125 | .. | 4 0 0 |
| 193,300 | ,, | June 29 | 4 | Do. 4 p.c. Deb. Stk. | 104–109 | .. | 3 13 5 |

† Next dividend will be at this rate. Prices marked * are "Ex div."

# NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.**

**Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.**

**TERMS OF SUBSCRIPTION to the "JOURNAL."**

**United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.**
Payable in Advance. If credit is taken, the charge is 25s. a year.

**Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.**

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
**Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.**

## OXIDE OF IRON.

**O'NEILL'S OXIDE**
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

**SPENT OXIDE PURCHASED IN ANY DISTRICT.**

GAS PURIFICATION & CHEMICAL CO., LD.
JOHN WM. O'NEILL,
*Managing Director,*
PALMERSTON HOUSE, LONDON, E.C.

---

**WINKELMANN'S**

**"VOLCANIC" FIRE CEMENT.**
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

---

**SULPHURIC ACID for Sale, specially** suitable for making Sulphate of Ammonia.
BROTHERTON AND CO, LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

---

**HYDRATED OXIDE OF IRON.**

**PREPARED from Pure Iron.**
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

---

**AMMONIACAL Liquor wanted.**
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

---

**PATENTS AND TRADE MARKS**
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

---

**SULPHATE OF AMMONIA**
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, POLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

---

**"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.**

**JOHN E. WILLIAMS AND CO.,**
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

---

**BROTHERTON & CO., LIMITED.**
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

---

**TO LET ON HIRE.**

**CYLINDRICAL Tank-Waggons, suitable** for the carriage of Benzol or Crude Naphtha.
Apply CLAYTON ANILINE COMPANY, LIMITED, Clayton, MANCHESTER.

---

**CORNELIUS BORST & CO.,**
AMSTERDAM.
DUTCH BOG ORE
for
GAS PURIFICATION.

---

**BIGGS, WALL, & CO., 13, Cross Street,**
Finsbury, E.C. *Telegrams:* "RAGOUT," LONDON.
*Telephone:* 273 CENTRAL.

SULPHATE PLANT—See Advt. in last week's issue.
CHARGING MACHINERY—See Advt. in this week's issue.
SATURATORS—See Advt. in next week's issue.

---

**J. & J. BRADDOCK (Branch of Meters** Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

---

## DUTCH OXIDE OF IRON.

**SPENT OXIDE PURCHASED IN ANY DISTRICT.**

**THE First Dutch Bogore Co., Ltd.,**
HOLLAND.
*General Manager (for England and Wales)—*
CHARLES E. FRY, LEAMINGTON.
*General Manager (for Scotland)—*
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

---

**ATTERTON'S Patent Charging** Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

---

**JOHN RILEY & SONS, Chemical Manu-** facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

---

**SPENT OXIDE.**

**THE South Metropolitan Gas Company** are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

---

**SITUATION wanted as Assistant to** Gas Engineer and Manager, or MANAGER of medium-sized Gas-Works. Eight Years' Practical Experience in the general management of a Gas-works. Total abstainer. Excellent Testimonials.
Address, No. 4451, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

---

**SMITH (General), used to Gas-Works** and Wheelwright Smithing, requires situation. 18 Years' Experience. Age 32.
Address, J.W., 32, Adelaide Street, W. CROYDON.

---

**NIGHT FOREMAN.**

**WANTED for large Gas-Works abroad,** a competent Man as above. Preference will be shown for one occupying similar position, or one engaged as Working Manager. Knowledge of Carburetted Water-Gas and Sulphate Manufacture will be an advantage.

**FITTINGS ASSISTANT.**

There is also required a YOUNG MAN as Fittings Assistant. Must be a qualified Gas Fitter, able to supervise work and get out designs and estimates. Knowledge of Drawing and Gas Manufacture advisable, but not essential. Engagement in each case for Five Years, with Second-Class passage by Mail Steamer out and home.
Applications, with *copies* of Testimonials, stating Age and Salary required, to be sent to No. 4458, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., not later than Sept. 15, 1905.

---

**WANTED, a Draughtsman, accus-** tomed to Elevating and Conveying Machinery for Electricity and Gas Works Plant, and Constructional Iron Work.
Address No. 4456, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

---

**CONSULTING Engineer has a vacancy,** in the country, for young CLERK with brains.
Apply, by letter, to No. 4459, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

---

**OXIDE OF IRON.**
(NATURAL.)

**BALE & CHURCH will be pleased to** send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
5, CROOKED LANE, LONDON, E.C.

---

## SULPHURIC ACID.

**SPECIALLY prepared for the Manu-** facture of SULPHATE OF AMMONIA.
**SPENCER, CHAPMAN, & MESSEL, LTD.**
(with which is amalgamated WM. PEARCE & SONS, LTD.)
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

---

**GLASS SHADES of every description,** for all kinds of Interior **GAS LIGHTING.** Illustrated sheets on application.
**JOHN WALSH WALSH,**
SOHO AND VESTA GLASS WORKS, BIRMINGHAM.
Telegrams: "VESTA, BIRMINGHAM."
National Telephone: No. 63.
London Show-Room: 4, HOLBORN CIRCUS, E.C.

---

**GAS TAR wanted.**
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

---

**TAR AND LIQUOR WANTED.**
Best Prices paid.
DENT AND CO.,
Ouse Chemical Works, SELBY.

---

**GAS PLANT for Sale—I can always offer** NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

---

**TO BE SOLD, Gasholder, 30,000 cubic** feet capacity; another 15,000 feet capacity. Both new and ready for delivery.
The WRIGHT GAS PLANT COMPANY, LIMITED, 181, Queen Victoria Street, LONDON, and SHIPLEY GATE.

---

**NEW or Second-Hand Gas Plant re-** quired for the extension of existing Gas-Works near London.
Apply for further Particulars to No. 4460, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

---

**FOR SALE.—A second-hand Station** Meter, in good condition. Capacity, 20,000 cubic feet per hour.
Offers to No. 4448, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

---

**SULPHATE of Ammonia Plant for** Sale. Six-inch Change Valve for Oxide Purifiers, complete. No unsealing in changing. Wilton's Discharger (almost new), for ten tons per twenty-four hours. Automatic Spent Liquor Discharge Valve, four-inch Connections.
Address inquiries to No. 4457, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

---

**SPECIAL Bargains. Increased Gas** Production equal to 10 per cent. on present make. New Combined Steam Engine and Gas Exhauster with 6-in. screw-down Valves, 8-in. Bye-Pass Valves, Governor, &c. Complete for £160 cash, if sold immediately. Very large stock of Apparatus to be cleared at a sacrifice, if sold this year.
FIRTH, BLAKELEY, AND CO., Gas Engineers, Thornhill, DEWSBURY.

**ROBERT DEMPSTER & SONS, Ltd.,** Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

### RAMSGATE CORPORATION.

(GAS AND WATER DEPARTMENT.)

**THE Committee invite Tenders for the** Purchase of their surplus COKE from the 1st of October, 1905, to the 30th of September, 1906 (probable quantity, 2000 to 3000 Tons), delivered free on rail or free into barge, Ramsgate; purchaser paying dues.

Further Particulars, together with Conditions and Form of Tender, may be obtained from the undersigned.

Tenders to be sent in not later than Noon on Saturday, Sept. 9, 1905, addressed o the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, and endorsed "Tender for Coke."

The Committee do not bind themselves to accept the highest or any Tender.

T. N. RITSON,
Engineer and Manager.

Gas and Water Offices,
Boundary Road, Ramsgate.

### GLASGOW CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR METERS.

**THE Corporation of Glasgow invite** TENDERS for the supply of DRY METERS for Twelve Months from date of acceptance of offer.

Forms of Tender may be obtained on application to Mr. Alexander Wilson, the Engineer, at his office, No. 45, John Street, Glasgow, and sealed Tenders, endorsed "Gas Department—Tender for Meters," must be lodged with the Subscriber, on or before Monday, the 11th of September next.

The Corporation do not bind themselves to accept the lowest or any Tender.

JOHN BOWERS,
Town Clerk.

City Chambers, Glasgow.
Aug. 25, 1905.

### RHONDDA URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

**THE above Council are prepared to** receive TENDERS for the Supply of WROUGHT-IRON TUBES and FITTINGS, LEAD PIPES, COMPO. PIPES, and BLOCK TIN.

Further Particulars and Forms of Tender may be obtained on application to the Engineer and Manager, Mr. Octavius Thomas, Gas and Water Offices, Pentre (Glam.).

No Form of Tender other than issued by the Council will be accepted.

The Contractors will be required to pay the standard rate of Wages recognized in the district.

Tenders, endorsed "Contract No. 7 or 8," as the case may be, addressed to the Chairman of the Gas and Water Committee, to be sent to the undersigned, on or before Ten a.m. on Thursday, the 14th of September.

The Council do not bind themselves to accept the lowest or any Tender.

WALTER P. NICHOLAS,
Clerk.

Council Offices, Pentre (Glam.),
Aug. 31, 1905.

**THE Newtownards Urban District** Council hereby invite TENDERS for the supply of about 2000 to 3000 Tons of COAL, NUTS, or SLACK.

Particulars may be had on inquiry from W. H. Roberts, Urban District Council Offices, Newtownards.

Tenders will be received by me, up to Thursday, Sept. 28, at noon.

H. MCCARTNEY,
Clerk to the Council.

Urban District Council Offices,
Newtownards,
Aug. 31, 1905.

### TENDERS FOR TAR.

**THE Haverfordwest Town Council** invite TENDERS for about 60 Tons of surplus TAR.

Also for the surplus, amounting to about 50 Tons annually, for Three Years ending the 31st of December, 1908.

Price per Ton delivered into Contractor's Tank-Waggons at the Railway Station, Haverfordwest.

Further Particulars to be obtained upon application to J. Gibbon, Manager, Gas-Works, Haverfordwest.

Tenders to be sent to the undersigned not later than Saturday, the 16th of September next.

The Council do not bind themselves to accept the highest or any Tender.

R. T. P. WILLIAMS,
Town Clerk.

Haverfordwest, Aug. 31, 1905.

### COUNTY BOROUGH OF WARRINGTON.

(GAS DEPARTMENT.)

**TENDERS are invited for the Supply** of a SATURATOR capable of producing Two Tons of Sulphate of Ammonia in twelve hours.

Sealed Tenders, endorsed, must be sent in not later than the 14th inst.

Further particulars may be obtained on application to Mr. W. S. Haddock, Engineer to the Works.

FREDK. TAYLOR,
Secretary.

Gas Offices, Warrington,
Sept. 2, 1905.

### KENT WATER-WORKS COMPANY.

In the matter of the Metropolis Water Act, 1902, and in the matter of the KENT WATER-WORKS COMPANY, in Liquidation.

Whereas the undertaking of the above-named Company was under the above Act transferred to the Metropolitan Water Board, on the 24th of June, 1904, subject to all debts, obligations, and liabilities, and the Company having distributed the compensation, are about to apply to the Board of Trade for a certificate with a view to dissolution.

**NOTICE is Hereby Given, that any** persons having any Claims against the said Company which may be payable by them, are hereby required to send the Particulars, in writing, of such claims to the undersigned Secretary of the Company, on or before the 15th day of September, 1905, after which date the Directors of the Company will close the liquidation of the Company.

Dated this 4th day of August, 1905.

A. DICKSON, Junr.,
Secretary.

Brookmill Road, Deptford, S.E.

### OTTOMAN GAS COMPANY, LIMITED.

**NOTICE is Hereby Given, that the** ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at 9, Queen Street Place, Cannon Street, E.C., on Tuesday, Sept. 12, 1905, at One o'clock precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June last, to declare a Dividend, and for General Purposes.

The TRANSFER BOOKS WILL BE CLOSED from Sept. 5 to 12, both days inclusive.

By order of the Board,
THOMAS GUYATT,
Secretary.

9, Queen Street Place, Cannon Street,
London, E.C., Aug. 15, 1905.

### SHEPPY GAS COMPANY.

SALE BY TENDER OF £5000 OF CONSOLIDATED ORDINARY STOCK,

Subject to a Maximum Dividend of 5 per cent.

MINIMUM PRICE, £100 PER £100 OF STOCK.

**THE Directors of the Sheppy Gas Com-** pany are about to issue a portion of the Additional Capital authorized by the Sheppy Gas Act, 1904, and they invite TENDERS for the sum of £5000 of CONSOLIDATED ORDINARY STOCK, limited to a maximum Dividend of 5 per cent. per Annum. No Tender of less than £100 per £100 of Stock will be considered.

The present Capital of the Company consists of 400 Preference £10 "A" Shares bearing a dividend of 4 per cent., and £63,000 Consolidated Ordinary Stock, limited to a 5 per cent. dividend (this Stock is the result of the conversion of 2100 £10 "B" Shares bearing a 10 per cent. dividend and 1500 £10 "C" Shares bearing a 7 per cent. dividend, which were converted by the Sheppy Gas Act, 1904, into an equivalent 5 per cent. Stock), and £4000 on loan.

The Company commenced business in 1859 as a limited liability Company, and in consequence of the development of their business further powers were necessary, and the Company was re-incorporated under a Special Act of Parliament in 1871.

The area of supply consists of the whole of the Isle of Sheppy, in Kent, containing the important Dockyard and Garrison town of Sheerness and the ancient borough of Queenborough which has a considerable and increasing mercantile trade.

The Sale of Gas amounted to 88,700,000 cubic feet in 1904, being an increase of 35,000,000 over the issue of 1895. There was an increase in the number of consumers during 1904 amounting to 9 per cent.

The full Dividends have been paid since 1863 and the Reserve Fund is up to the amount allowed by the 1871 Act, the new Act only having come into force this year.

The Dividends are paid about the last week in March and September, and the Stock now offered will carry a dividend as from the 1st of October next.

The liability of the Stockholder is limited—that is, when the Stock is paid for, there is no further liability whatever.

The Stock will be issued in amounts of not less than Ten Pounds, or multiples thereof, and will be allotted to the highest Tenderers.

Tenders will be received at the Company's Offices not later than the 16th of September, and the balance of the purchase-money must be paid in full not later than the 30th of September, 1905.

Forms of Tender may be obtained from the Secretary of the Company.

SHEPPY GAS COMPANY'S OFFICES.
2, Trinity Road, Sheerness,
Aug. 8, 1905.

*Now Ready, pp. 584 and XVI. 251 Illustrations. F'Cap. Quarto, Price 18s. net (Post Free).*

THE SEVENTH EDITION OF

**NEWBIGGING'S HANDBOOK**

FOR

**GAS ENGINEERS AND MANAGERS**

(DEDICATED TO SIR GEORGE LIVESEY).

Orders may be sent through any Bookseller, or direct to the Publisher,

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

### ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

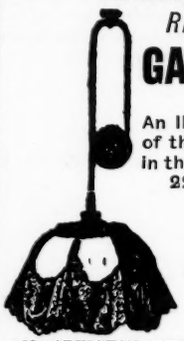
**MR. ALFRED RICHARDS** begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

**THE "HANWELL" PATENT**

*Rising and Falling*

**GAS PENDANT**



An Illustrated Description of this Pendant appeared in the "Journal" for Nov. 22, 1904 (page 599).

Write for full Particulars to the

"HANWELL" Pendant Company,

96, ABINGTON STREET, NORTHAMPTON.

**THOMAS TURTON AND SONS, LIMITED,**

**SHEAF WORKS, SHEFFIELD**

MANUFACTURERS OF

**FILES OF BEST QUALITY**

**FOR ENGINEERS.**

**STEEL OF ALL DESCRIPTIONS.**

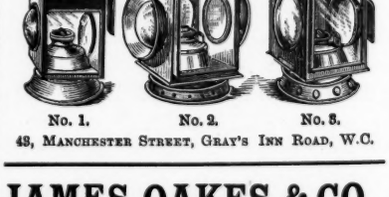
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY,

LONDON OFFICE:

**90, CANNON STREET, E.C.**

**ARMSTRONG'S PATENT**

**CANDLE SAFETY LAMPS.**



No. 1. No. 2. No. 3.

43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

**JAMES OAKES & CO.,**

**ALFRETON IRON-WORKS, DERBYSHIRE,**

AND

**Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.**

Manufacture and keep in Stock at their Works (also large Stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

# APOLOGY.

*September* 1, 1905.

To

## Messrs. The Star Inverted Incandescent Burner Co., LIMITED,

**104 & 105, GREAT SAFFRON HILL, E.C.**

Gentlemen,

We much regret having sold or otherwise offered for Sale Inverted Incandescent **Two-Clip Mantles** made in Infringement of your Registered Design, **No. 427,544,** and in consideration of your not proceeding further with your Action against us, we consent to a **Perpetual Injunction,** and to indemnify you from the costs to which you have been put. We agree to Destroy all the infringement mantles we have in stock and undertake never to sell any Two-Clip Inverted Incandescent Mantles, except those of your Sale or Manufacture. We regret, exceedingly, that we should have put you to any trouble in the matter, and undertake not to Infringe your undoubted Rights in the future. You are at liberty to make what use you may think fit of this undertaking and Apology. We agree to pay the costs of publishing this Apology in one paper at your discretion.

Yours faithfully,

**THE UNITED WHOLESALE INCANDESCENT GAS COMPANY, LIMITED.**

*Witness,* JONATHAN E. HARRIS,
95, Leadenhall Street, E.C.
Solicitor to the
**Star Inverted Incandescent Burner Co., Ltd.**

M. WOLFF
G. KLEE
} Directors.
Fulham Palace Road, Hammersmith, and King Street, Hammersmith.


**TROTTER, HAINES, & CORBETT,**
BRETTELL'S ESTATE LIMITED,
**FIRE-CLAY & BRICK WORKS,**
**STOURBRIDGE.**

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
**Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.**
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: H. CRESSWELL & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

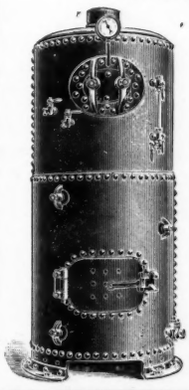
**GILBERT LITTLE & CO.LTD.**
*Conveyor and Elevator Specialists,*
**Smethwick, Birmingham.**
Make known your wants for Conveyors and Elevators to GILBERT LITTLE, the Pioneer Specialist: he will supply them.

**NEWBATTLE CANNEL.**
**Highest Results in Gas, & Excellent Coke.**
QUOTATIONS ON APPLICATION TO
**THE LOTHIAN COAL COMPANY,**
LIMITED,
**NEWBATTLE COLLIERIES,**
**DALKEITH, N.B.**

**PRICE'S COKE & COAL BARROW**

effects a great saving of time, labour, and expense.
For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

**THE GRANTHAM BOILER AND CRANK CO., LTD.**
**GRANTHAM.**



Makers of
**STEAM BOILERS**
(of all types and powers).
Vertical, Loco, Cornish, and Lancashire.
FEED-WATER HEATERS.
VERTICAL ENGINES.

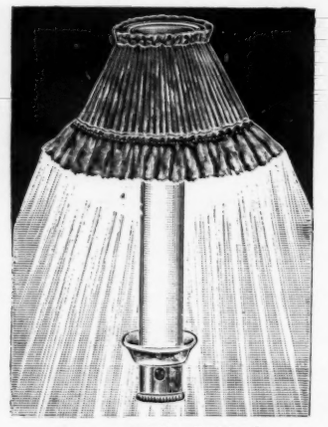
**THOMAS DUXBURY & CO.,**
**16, DEANSGATE, MANCHESTER,**
**Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.**
*Inquiries Solicited.*
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

**GAS LAMPS,**
**REFLECTING LANTERNS, &c.**
**S. SHERMAN & SON,**
**WEST CENTRAL GAS LANTERN WORKS**
*HEAD OFFICE:*
**57, NEW COMPTON ST., W.C.**
CATALOGUE (Just Printed) ON APPLICATION.
Telephone: 4939 Gerrard.
Telegrams: "Illuminate, London."

THE
**"ROTARY"**
**STATION METER.**
**Efficiency Demonstrated.**
*APPLY—*
**T. G. MARSH,**
**MAWSON CHAMBERS, DEANSGATE, MANCHESTER.**

Gas Companies are solicited to try Samples of the
**MIRFIELD GAS COAL**
**UNEQUALLED.**
**Sperm Value 878·85 lbs. per Ton.**
*Prices and analysis on application.*
**The MIRFIELD (GAS-COAL) COLLIERIES CO., RAVENSTHORPE, NEAR DEWSBURY.**

**HEATHCOTE GAS COAL.**
**Rich in Illuminating Power and yield of Gas.**
**Above the Average in Weight and Quality of Coke.**
**Maintains a High Standard in Residuals.**
**THE GRASSMOOR CO., LD.,**
**CHESTERFIELD.**



*Patent applied for. Registered.*

GREAT NOVELTY

THE

'ROYAL' INCANDESCENT

GAS-LIGHT CANDLE.

**The most decorative Gas-Light ever offered.**

**A perfect combustion Burner.**

**Cannot get out of order.**

**60-Candle Power with 2½ cubic feet of Gas.**

**Can be used anywhere instead of a "C" Burner.**

Address of your nearest Wholesale Factor will be sent on application to No. 4374, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LARGEST MANUFACTURERS in the UNITED KINGDOM of GAS-RETORTS,

**Horizontal** or **Inclined**; also Makers of **Segmental Retorts** of all **Sections**.

PATENTEES OF

Machine-Flanged RETORTS.

DIBDALE WORKS, **DUDLEY.**

B. GIBBONS, JR., LD.

TELEPHONE DUDLEY NO. 10.

Telegraphic Address: "MACHINE, LOWER GORNAL."

"ABC" Code and UNICODE used for Telegrams and Cablegrams.

SPECIAL BRICKS & BLOCKS of every description for GENERATOR and REGENERATOR FURNACES.

Large Stocks of Bricks of all sizes, Burrs, Boiler Seating Blocks and Covers, Plain and Rebated Tiles, &c., &c.

Retorts and other Fire-Clay Goods carefully packed for export.

FOREIGN AND HOME COPIES OF ILLUSTRATED CATALOGUES ON APPLICATION.

GAS COAL AND CANNEL.

WILSON CARTER & PEARSON, LIMITED.

Gas, Steam, and other Fuel for Home and Export.

GAS COKE CONTRACTORS.

CHIEF OFFICES:

50, NEW STREET, BIRMINGHAM.

BOWENS' Ltd. Successors, STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

ESTABLISHED 1860.

STEEL SCOOPS

FOR

RETORT CHARGING.

Scoops supplied with or without handles, and of any dimensions or shape required.

HENRY SYKES, Ltd., Engineers, 66, BANKSIDE, LONDON, S.E. Telephone No. 565 HOP.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.

AGENTS FOR

*ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.*

Wrought-Iron

TUBES

And Fittings & Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E

THE

STAVELEY COAL AND IRON COMPANY, LTD.,

CHESTERFIELD (Established over 100 Years),

34, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURE GAS & WATER PIPES,

PIG IRON, CYLINDERS, GASHOLDER TANKS, COLUMNS, & HEAVY CASTINGS OF EVERY DESCRIPTION.

Agent for London and District: C. E. JONES, C.E.,

9, MANOR TERRACE, LEA BRIDGE ROAD, LEYTON, E., to whom all enquiries should be addressed.

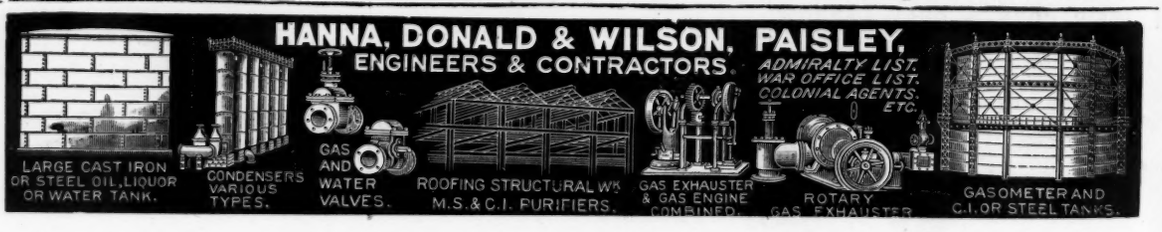


FIG. I. 422.
SQUAT LAMP.

PRICE LISTS ON APPLICATION.

THE

# "TUNBRIDGE WELLS" GAS-LAMP

## FOR KERN BURNERS,

with Bye-Pass Lever Cock at Bottom. Patent.

**EVERY LAMP PERFECT AND GUARANTEED SHADOWLESS.**

ADOPTED BY VARIOUS GAS COMPANIES.

UNSURPASSED IN

**Illuminating Power, Economy, Durability, and Simplicity.**

ENAMELLED IN THE FOLLOWING COLOURS:

WHITE AND GOLD. BLACK AND GOLD.
BROWN AND GOLD.

**FIG. I. 422.** Squat Lamp for low ceilings, with 18 in. Reflector and Pilot Light Tubes for Two Size 3 Kern Burners. Extreme Length as drawn, 20 inches.

*Manufactured by*

**GUEST & CHRIMES, FOUNDRY & GENERAL BRASS WORKS, ROTHERHAM.**

# JÄGER PATENT PURIFIERS

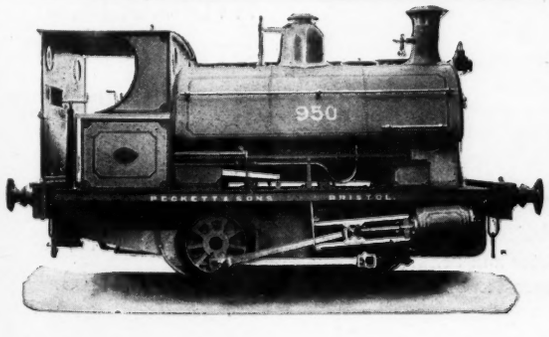
ADOPTED AT

BOURNEMOUTH
BRENTFORD
BURNLEY
CAGLIARI
CALCUTTA.
CHESTER 1st Order
CHESTER 2nd Order
CHESTER 3rd Order
COVENTRY
DEAL
EDINBURGH
ENFIELD
HULL
HALSTEAD
HARROGATE
LEAMINGTON 1st Order
LEAMINGTON 2nd Order
NORTHAMPTON
OLDHAM 1st Order
OLDHAM 2nd Order
ROCHESTER 1st Order
ROCHESTER 2nd Order
ROTHERHAM
COLLIERIES.
SHEFFIELD
SOUTHEND
WINCHESTER
WESTGATE
WELSHPOOL

# SAML CUTLER & SONS,

## MILLWALL, LONDON.

No. 199.




# LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate delivery.

**Photographs, Specifications, and Prices on Application.**

**PECKETT & SONS,** Atlas Locomotive Works, **BRISTOL.**

**Telegraphic Address: "PECKETT, BRISTOL."**

# 5 Modern Maxims 5

**"He who begins with the Kayes and does not finish the thousand, loses a lot of money"**

The K burner is so cheap and universally useful, that you can sell it by the gross. For 3s. anybody can have a burner and mantle. Yet it is the best inverted burner made—brilliant, economical, safe, and simple. It absolutely won't go wrong, blacken, or worry your customer in any way.

MOFFAT'S LTD., 155, FARRINGDON ROAD, LONDON, E.C.

---

**BEEHIVE WORKS,** **RETFORD.**

# W. J. JENKINS & CO., LTD.,

SOLE MAKERS OF THE

# D.B. PATENT COAL PROJECTOR,

THE JENKINS

# DE BROUWER DISCHARGER,

AND THE

# DE BROUWER PATENT HOT COKE CONVEYOR.

MAKERS OF EVERY DESCRIPTION OF **GAS PLANT,** COAL AND COKE BREAKERS, ELEVATORS, ROOFS, STAGE FLOORS, HYDRAULIC MAINS & RETORT FITTINGS.

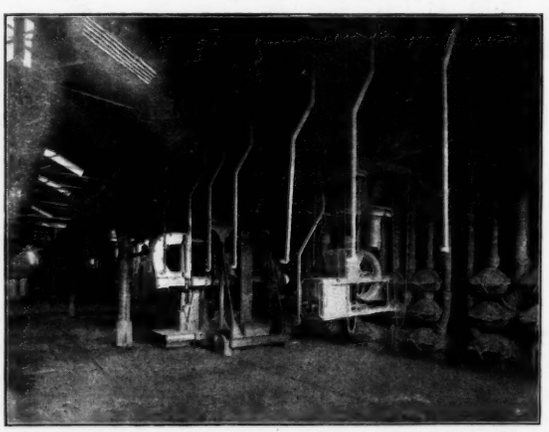


Photo showing the "D.B." Projector and Jenkins "D.B." Discharger at work in the Lancaster Gas-Works.

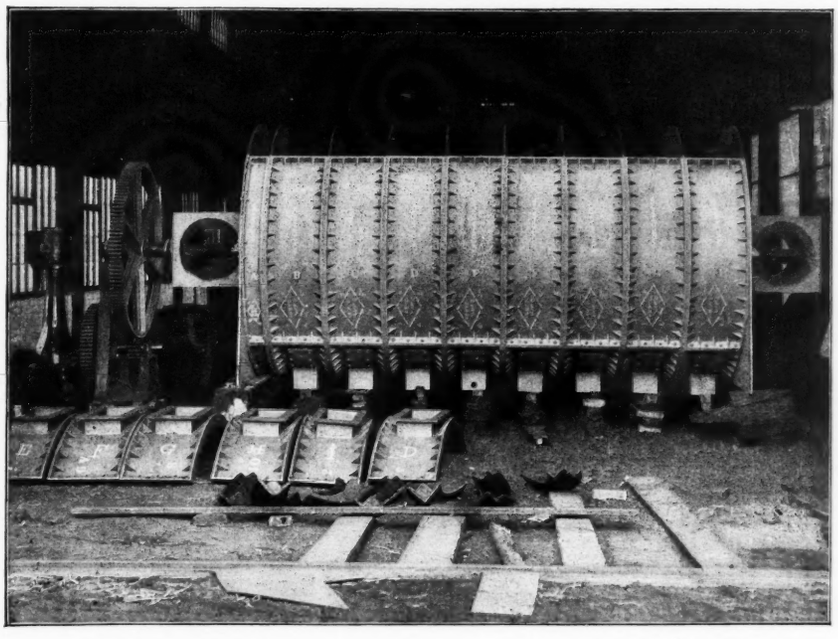
MAKERS OF HIGH CLASS ELECTRIC, COMPRESSED AIR, HYDRAULIC, OR STEAM DRIVEN **STOKING MACHINERY** FOR GREAT BRITAIN AND THE COLONIES.

# THE WHESSOE FOUNDRY CO., LTD.

**Works: DARLINGTON.**

LARGE AREA OF WASHING SURFACE.

REMOVAL OF THE WHOLE OF THE AMMONIA AND A LARGE PERCENTAGE OF $CO_2$ AND $SH_2$.



SLIP OF GAS IMPOSSIBLE OWING TO OUR PATENT TELESCOPIC SLIDING JOINT

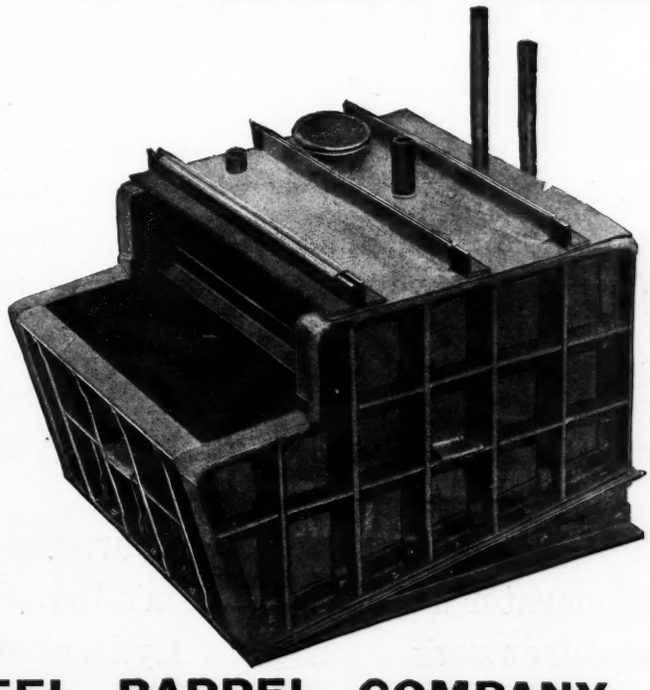
BUNDLES EASILY ACCESSIBLE FOR CLEANING.

**"Whessoe" Rotary Washer-Scrubber** (H. Kirkham & Chandler's patent). **Capacity 1,500,000 Cub. ft. per diem.**
One of Two Machines supplied by us to a Foreign Gas-Works, photographed in our shops during course of construction.

London Office: **106, CANNON STREET, E.C.**

# STANDFAST'S PATENT SULPHATE OF AMMONIA SATURATOR

**ELECTRICALLY WELDED!**



**ALSO**

**STEEL BARRELS and DRUMS**

**FOR**

**Benzol, Tar, Creosote, Gasolene Petrol, &c.**

**Prices on application.**

**ALL JOINTS ELECTRICALLY WELDED.**

**SOLE MAKERS:**

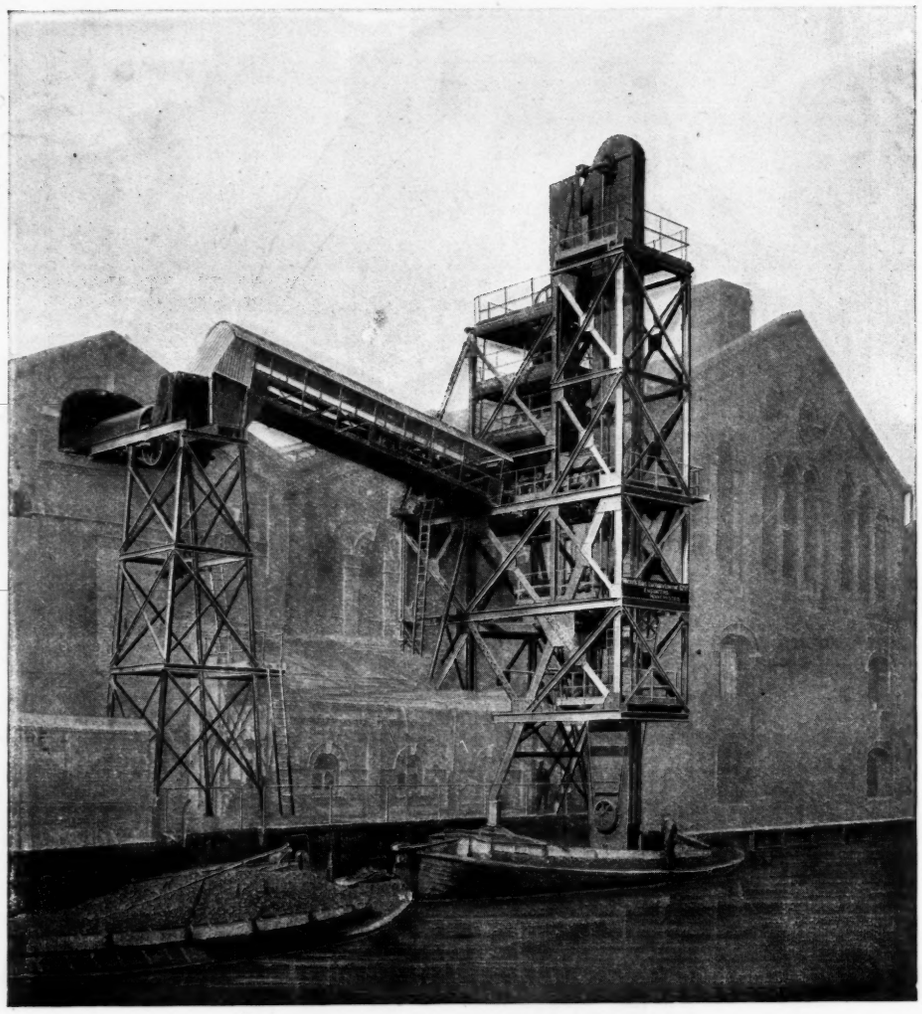
## THE STEEL BARREL COMPANY, LIMITED,

Telegraphic Address: "BARRELS, UXBRIDGE." **Uxbridge, MIDDLESEX.** Telephone: No. 044 UXBRIDGE.

**Contractors to His Majesty's Government, Government of India, British and Foreign Railways, &c.**

# WEST'S GAS IMPROVEMENT CO., LTD.,

## GAS AND GENERAL ENGINEERS.



PHOTOGRAPH SHOWING

**West's Coal Handling Plant for unloading Barges, Elevating, Breaking, Automatic Weighing, Conveying, and Storing the Coal in Stores.**

## STOKING MACHINERY SPECIALISTS

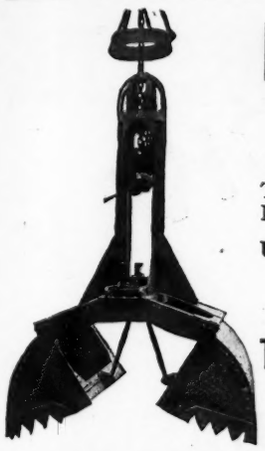
**Over 140 Installations of West's Stoking Machinery now at work.**

**West's Patent Coke-Conveyors.**
**,, ,, Regenerator Settings.**
**General Structural Ironwork.**

**The Bournemouth Arch-Pipe.**
**Belton's Relief Apparatus for Hydraulic Mains.**

**ADDRESS—ALBION IRONWORKS, MILES PLATTING, MANCHESTER.**

**Telegrams: "STOKER, MANCHESTER."** **Telephone Nos. 1339 & 3520.**



# HONE'S PATENT GRABS

**Automatic, Efficient, & Economical.**

APPLICABLE TO ANY ORDINARY SINGLE CHAIN CRANE.

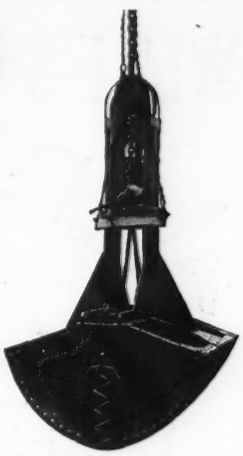
These Grabs are unequalled for handling Coal, Coke, Ballast, Sand, Macadam, Ores, &c., effecting in all cases very substantial savings.

**Used by all the Principal Gas Companies, Colliery Owners, Coal Merchants, Engineers, Contractors, &c., at Home and Abroad.**

*Applications for Prices and Particulars are invited by the Sole Manufacturer—*

**THE THAMES IRON WORKS, SHIPBUILDING, and ENGINEERING COMPANY, LTD.,**

**CANNING TOWN, LONDON, E.**



# THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE.

MAKERS OF

# GASHOLDERS & GAS PLANT.

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES,

PIPES, LAMP-PILLARS, RETORT-FITTINGS, ETC.

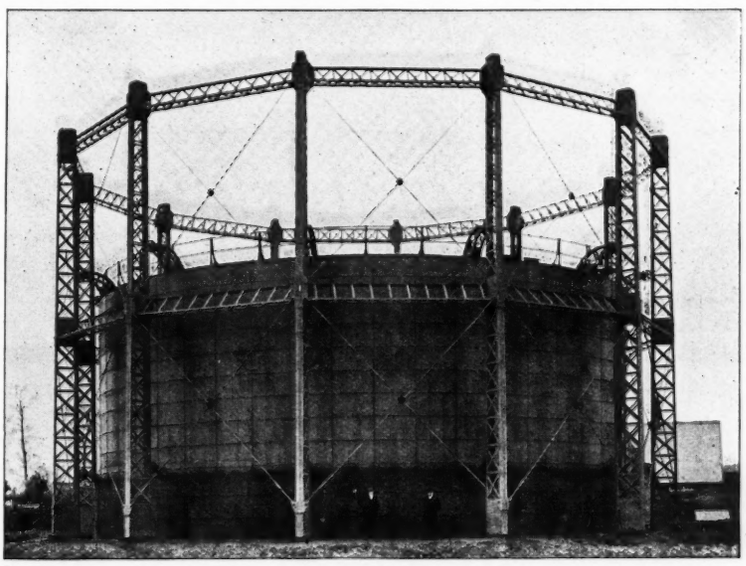
ALSO ALL KINDS OF

STRUCTURAL IRON AND STEEL WORK

BRIDGES,

ROOFS

PIERS, ETC.



WORKS & HEAD OFFICE:
TIPTON,
STAFFORDSHIRE

LONDON OFFICE:
11, VICTORIA STREET,
WESTMINSTER.

TELEGRAPHIC ADDRESSES:
"HORSELEY, TIPTON."
"GALILEO, LONDON."

# THE SILICA FIRE-BRICK COMPANY.

**OUGHTIBRIDGE.**

# RADIATE MORE HEAT

BY USING

# SILCO BRICK RETORTS.

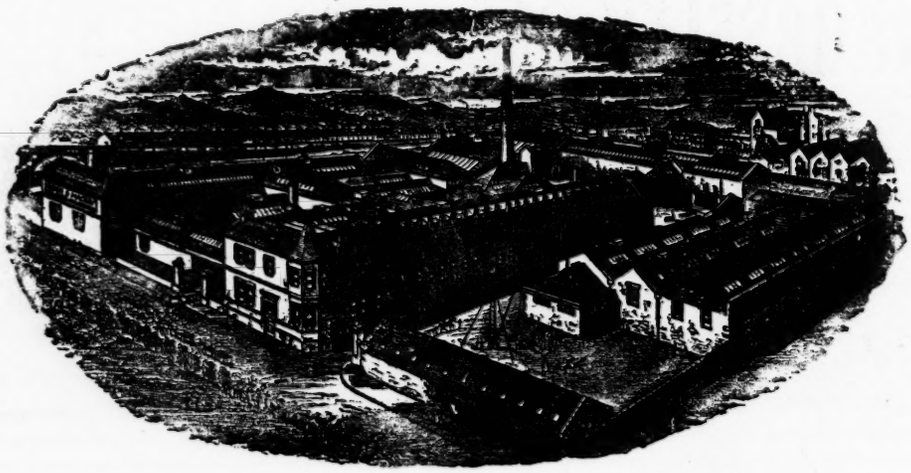
**SILCO BRICKS prevent all settling of setting.**

**SILICA BRICKS for Combustion Chambers, any shape.**

# ALDER & MACKAY

**ESTABLISHED 1850.**

## GAS-METER MANUFACTURERS.



*SPECIALITIES.*

**Dry Meters in Cast-Iron Cases.**

**Wet and Dry Prepayment Meters.**

**Green's Patent Underground Wet Meters.**

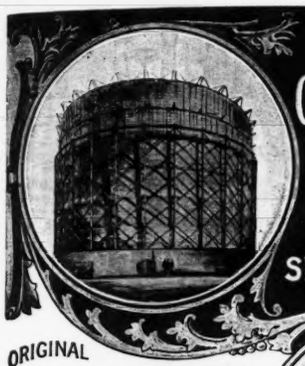
NEW GRANGE WORKS, Telephone No. 81 Western. EDINBURGH.

Telegrams: "ALDER" EDINBURGH OR BRADFORD.

VENTNOR STREET WORKS, Telephone No. 1222. BRADFORD.

Central House, NEW STREET, BIRMINGHAM.

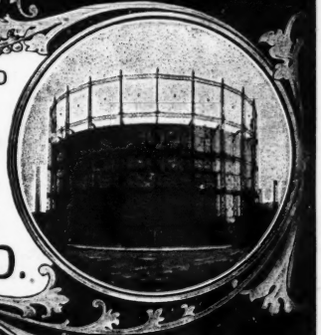
Telegraphic Address: "ALDERUGI, BIRMINGHAM."



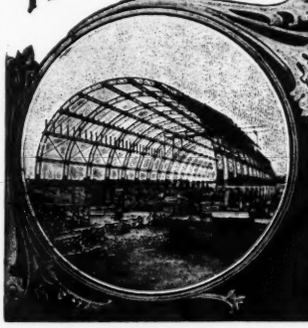
THE LARGEST GASHOLDER -IN THE- WORLD.

GASHOLDERS -OF ALL- SIZES AND STYLES.

ORIGINAL MAKERS OF SPIRAL GUIDED HOLDERS.



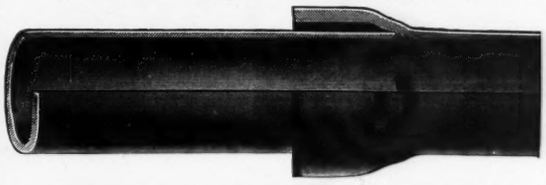
Gasholder WITH LARGEST METAL TANK IN THE WORLD.



GAS PLANT OF EVERY DESCRIPTION ROOFS, TANKS. STRUCTURAL STEEL WORK, BOILERS, &c

CLAYTON SON & Co Ld LEEDS.

MANNESMANN



WELDLESS STEEL SPIGOT AND FAUCET PIPES

In any Length up to 40 feet for GAS & WATER MAINS.

A PERFECT SUBSTITUTE FOR CAST-IRON MAINS.

— THE —

BRITISH MANNESMANN TUBE Co.,

— LIMITED, —

110, CANNON STREET, LONDON, E.C.

PATENTEES & EXPERTS.

SAFETY. REMEMBER. ECONOMY.

150 ARE AT WORK.

MANY REPEAT ORDERS.

DEMPSTER'S IMPROVED PATENT SPIRAL GUIDED GASHOLDERS.

AVOID COLOURABLE IMITATIONS AND INSIST UPON HAVING PATENT SPIRAL PLATES.

THESE PERFECTED SPIRAL GASHOLDERS HAVE STOOD ALL TESTS, & ARE THE SAFEST GASHOLDERS IN THE WORLD. GUIDES & ROLLERS ALWAYS ACCESSIBLE.

"YOUR SPIRAL HOLDER STANDS LIKE A ROCK."

R. & J. DEMPSTER, LTD., MANCHESTER.

Night Photo. by the **KEITH LIGHT.**

CORNER OF EDGWARE ROAD AND BELL STREET, LONDON.

**JAMES KEITH AND BLACKMAN CO., LTD.,**

Engineers and Specialists in High Pressure Gas Lighting, Heating, and Ventilating,

**27, FARRINGDON AVENUE, LONDON, E.C.,**

And at GLASGOW, MANCHESTER, LEEDS, and BIRMINGHAM.

---

# CLAPHAM BROS., LTD.

*ESTABLISHED OVER 60 YEARS.*] KEIGHLEY.

# SPECIALISTS

IN THE MANUFACTURE OF **CONDENSERS, WASHER-SCRUBBERS,** AND

TAR EXTRACTORS, VALVES, MAINS, **DRY LUTE PURIFIERS.**

**CARBONIZING PLANTS, FOR INCLINED OR HORIZONTAL SYSTEMS. LAMP COLUMNS, TANKS, ETC.**

London Representatives: Messrs. JONES & YOUNGER, Chesterfield House, 98, Great Tower Street, E.C.
Scotch Representative: JOHN D. GIBSON, 74, York Street, Glasgow.

Printed for WALTER KING by King, Sell. & Olding, Ltd.; and published by him at 11, BOLT COURT, FLEET STREET, in the CITY OF LONDON.—Tuesday, Sept. 5, 1905.